Planning
for
Meaningful Evaluation

National Oceanic and Atmospheric Administration
Coastal Services Center

NOAA Coastal Services Center

Guiding the conservation and management of the nation's coastal resources is a primary function of the federal government's National Oceanic and Atmospheric Administration (NOAA). This goal is accomplished through a variety of mechanisms, including collaboration with state coastal programs.

NOAA's Coastal Services Center supports local and state coastal programs by facilitating their access to the most up-to-date technology, information, and management strategies available in this field of work.

NOAA Coastal Services Center
2234 South Hobson Avenue
Charleston, South Carolina 29405
(843) 740-1200

www.csc.noaa.gov

Acknowledgments

Instructors

Sacheen Tavares-Leighton (*Sacheen.Tavares@noaa.gov*) is a coastal training specialist at NOAA's Coastal Services Center. Her responsibilities include training design, development, and delivery, as well as serving as an instructional and evaluation design consultant by providing technical assistance for NOAA partners and customers.

Sacheen has engaged in a variety of evaluations, including revision of the Coastal Zone Management Act evaluation process; a return on investment (ROI) study on the Coastal Management Fellowship program; development and implementation of NOAA office performance measures; a joint external review of NOAA's National Estuarine Research Reserves Coastal Training Program and Coastal Services Center Training, and many others. She has been working in the field of marine science education and program development with extensive experience in formal and informal education, serving as the outreach coordinator for the University of Miami's Rosenstiel School of Marine and Atmospheric Science and as an extension agent with the University of Florida's Sea Grant Extension Program, where she designed, implemented, and evaluated educational outreach programs on marine resource management and coastal issues. Other experience includes working in the nonprofit arena to develop environmental education programs for diverse groups about the Cape Florida Project—a 432-acre habitat restoration of a barrier island park in South Florida.

Sacheen holds a master of arts in marine affairs from the University of Miami's Rosenstiel School of Marine and Atmospheric Science and a bachelor of science in zoology and botany from the University of the West Indies. She is certified in evaluation practice (The Evaluators' Institute), and is also a member of the American Evaluation Association.

Paige Gill (*Paige.Gill@noaa.gov*) serves as an instructional systems consultant to NOAA's Coastal Services Center. Her responsibilities include guidance and participation in training needs assessment, training design and development, as well as formative and summative course evaluation.

Paige has conducted a variety of evaluations, including a meta-evaluation of land management practices regarding sustainable agriculture in developing countries for the World Health Organization; an evaluability assessment of the environmental education program at a National Estuarine Research Reserve; and a theory-driven evaluation of an innovative middle school curriculum. She has designed, developed, and evaluated training programs for the Florida Park Service interpretive staff and Biscayne National Park's marine enforcement officers. She worked with the Florida Department of Environmental Protection's (FDEP) Bureau of Coastal and Aquatic Managed Areas to assist in strategic planning and was education coordinator for the Key Largo and, later, Florida Keys National Marine Sanctuary. Paige began her professional career with FDEP as a marine ecologist, conducting field and laboratory research for the commercial clam industry.

Paige holds a master of arts in instructional systems from Florida State University, is certified in program evaluation, and holds a bachelor of science in environmental technology and aquaculture from the Florida Institute of Technology.

Chris Ellis *(Chris.Ellis@noaa.gov)* is a social scientist within the Human Dimensions program at NOAA's Coastal Services Center. Chris provides an array of services and technical assistance to Center customers on conducting evaluations and on social scientific inquiry and research. Playing a dual role as a Center trainer, he provides expertise in the development and design of Center training products and delivers the Managing Visitor Use in Coastal and Marine Protected Areas training course.

Before coming to NOAA, Chris was employed by the National Park Service's Social Science Program in Washington, D.C. Here, he engaged in a number of evaluation-based projects, including a national assessment of the National Park Service's Junior Ranger Program. Additionally, he has conducted outdoor recreational and behavioral research in the university setting, both as a graduate researcher and professor for seven years.
Chris completed his doctorate in coastal resources management in May 2005 from East Carolina University.

Zac Hart (*Zac.Hart@noaa.gov*) is a trainer, social scientist, and outreach specialist at the NOAA Coastal Services Center. Zac delivers two Center trainings and provides technical expertise on the design and evaluation of a host of coastal management events, products, and programs. Zac also supports the Center's Human Dimensions Program, which applies social science methods to solve real-world problems, and he leads outreach and marketing for a variety of the Center's social science products and services.

Before beginning with NOAA in 2004, Zac spent two years with the Trust for Public Land, a national land conservation organization, where he specialized in grant writing, outreach and marketing, fundraising, conservation planning, and real estate. Zac has also worked as a freelance environmental journalist and an environmental educator for the Charleston County Park and Recreation Commission.

Zac holds a master of environmental studies degree from the College of Charleston and earned a bachelor of science in biology from Winthrop University. Zac is certified in instructional systems design and is also a member of the American Evaluation Association and the Grant Professionals Association.

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Course Overview, Goal, and Objectives

OBJECTIVE

Understand how this course will . . .

- Meet the workplace evaluation needs of coastal resource professionals

- Enable participants to overcome many of the barriers to effective and efficient evaluation

- Enable participants to create an evaluation plan that improves the likelihood of meaningful results

Course Overview, Goal, and Objectives

Overview

This course addresses the increasing demand for accountability and evidence of the impacts of programs or projects by providing detailed information about evaluating those programs and projects. This two-day training will actively engage participants in creating a comprehensive evaluation plan. The course is not intended to train participants to be professional evaluators, competent in all aspects of evaluation, but rather its purpose is to provide a deeper understanding of evaluation so that participants are able to make informed choices to create fundamentally sound evaluation plans.

Whether planning for an in-house or contracted evaluation, participants will critically analyze their evaluation priorities and address the myriad of issues that can hamper evaluation efforts and undermine the usefulness of evaluation results. Participants will also gain insights on data collection, analysis options, and reporting considerations. By the end of this training, participants will have created draft plans for efficient and effective evaluation of their programs or projects.
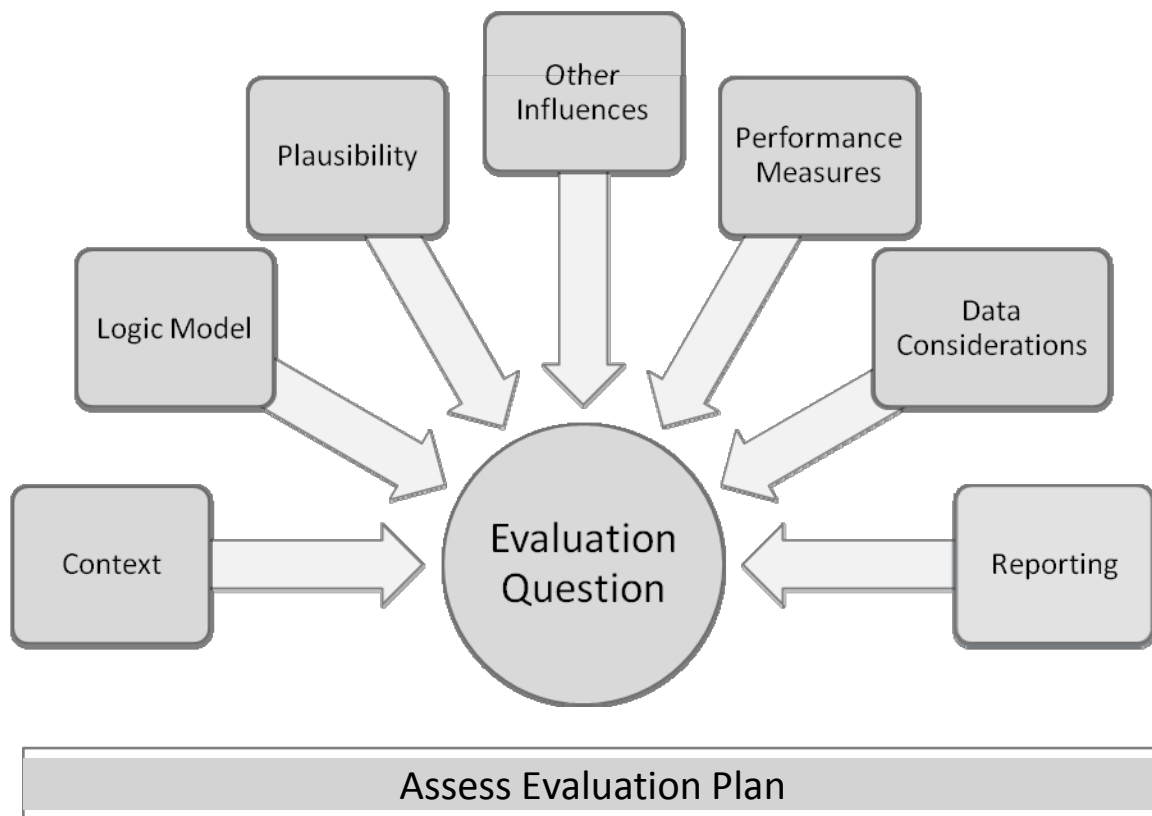
Target Audience

This training course is designed for coastal professionals wanting to learn more about program or project evaluation. The course is appropriate for those managing an evaluation, planning an internally or externally conducted evaluation, or setting guidelines for evaluation efforts. The target audience includes those who need to learn more about evaluation and the considerations and steps needed to prepare for an evaluation, rather than those who already have a solid base of experience in the field. Participants need not have evaluation experience but must have experience using logic models.

Course Goal

Improve your ability to plan for a project or program evaluation that is efficient and effective and can yield meaningful results.

Course Objectives

To achieve the course goal, participants will be able to

1. Determine the evaluation question

2. Create a context description relevant to the evaluation question

3. Identify logic model components appropriate to the evaluation question

4. Assess the plausibility of achieving outcomes using strategies from social science models

5. Identify influences that can help or hinder the evaluation

6. Create effective performance measures that support the evaluation question

7. Select appropriate data collection methods

8. Analyze the strengths and weaknesses of an evaluation plan

With this course, coastal professionals will increase their understanding of the evaluation process and gain knowledge that will help them communicate with evaluators and overcome common barriers to meaningful evaluation. Participants will create a program or project evaluation plan by completing a series of planning templates that are designed to be useful upon return to the workplace.

Why Are We Here?

Accountability. Efficiency. Effectiveness. None of these can be achieved without evaluation. But merely conducting an evaluation does not guarantee results that demonstrate accountability or allow improvements in program or project effectiveness or efficiency.

Program evaluations are far too important, expensive, and time-consuming for anyone involved to find out in the final report that substantial programmatic obstacles prohibit answering evaluation questions—and that the recommendations are, at best, merely suggestions to overcome those obstacles or, at worst, are perplexing or not useful. Such results do not meaningfully answer the program's questions about whether there is a need to adjust program operations or whether a program, project, or product is having the intended outcomes or impact.

We are here to create a draft evaluation plan and, in so doing, learn about the basic considerations and steps to avoid or overcome many of the difficulties and frustrations with evaluations—and increase the potential to efficiently yield meaningful results.

An evaluation can be an important tool in improving the quality of a coastal resource program if it is woven into the fabric of a program rather than tacked on after the fact. Program personnel are more likely to use the results of an evaluation when they play a role in deciding what to examine, in conducting the evaluation, and in interpreting the results. The evaluation planning steps outlined in this course can and should be carried out by program or project staff members. The complexity of the evaluation design will determine the level of need for the expertise of a professional evaluator.

Reasons to Evaluate

Those who request evaluations do so for a variety of reasons.

Proper management – managers often choose to evaluate in order to keep track of program or project activities. Usually, the data collected relate directly to program or project operations, such as participant information, program or project activities, staff resources, and costs. The availability of these data allows managers to make modifications to current programming, as well as plan for future programming. The data are often of the variety used to populate a "Management Information System (MIS)," and are often used when fielding data requests from stakeholders.

Staying on track – evaluations can be useful for keeping programs or projects on track toward their stated goals and objectives. Similar to an evaluation for program or project management, this evaluation provides more information that can be used to strengthen the program or project in specific areas, and ensure that each component remains linked to the others.

Efficiency – evaluating for program or project efficiency helps identify techniques that can maximize products and services over time, or at lower costs. Evaluations for efficiency build on process and outcome evaluations (see section "Types of Evaluation"), and are essential when making decisions about allocation of resources.

Accountability – generally, evaluations for accountability are requested (or mandated) by external stakeholders such as funders, decision makers, elected officials, and citizen groups or grassroots organizations.

Development and dissemination of new programs or projects – evaluation can be useful in determining the effectiveness of new programs and projects as they are developed—and even as they are disseminated. Does the program or project really provide the benefit advertised? Are the appropriate audiences being targeted? Are the programs or projects delivered according to plan?

The benefits gleaned from an evaluation are often dependent on the type (process, outcome, or impact) of evaluation being conducted. However, if properly planned, this is what evaluation can do for you (and your program or project):

- Assist with Government Performance and Results Act (GPRA) requirements by reporting on results: the performance measures collected, the outcomes achieved, and the goals met

- Provide justification for funding decisions by communicating with stakeholders about the value of the program or project, and provide program or project staff members with the data requested by decision makers

- Provide input for program planning by identifying the products and services needed and by determining which program design works best

- Identify program strengths and opportunities to enhance program effectiveness

- Improve organizational efficiencies by monitoring program or project performance, and by determining which approaches best achieve the goals of the program or project

- Produce data for public use

Some Reasons *Not* to Evaluate

There are situations when evaluation is a choice rather than a mandate. Undertaking an evaluation is a significant investment of resources and should be reconsidered if one or more of the following conditions exist.

- The purpose is not agreed upon

- Resources are inadequate

- Evaluation skills are inadequate

- Implementation is insufficient in quantity or quality

- Criteria for measuring achievement are not identified or cannot be feasibly implemented

- Decision makers are not receptive to suggestions

- Results will not be used

Planning for Evaluation

Many coastal resource professionals are familiar with, work with, or are themselves research professionals. Less often do course participants know about or work in such close contact with professional evaluators. Although the process of evaluation may seem elusive, the planning and conducting of an evaluation is quite similar in many respects to any research endeavor. Whether research biologist or professional evaluator, both will conduct an investigation following these steps:

Design a plan that uses precise methods

⇩

Gather physical evidence

⇩

Observe and compare

⇩

Learn new information

⇩

Draw conclusions

⇩

Report
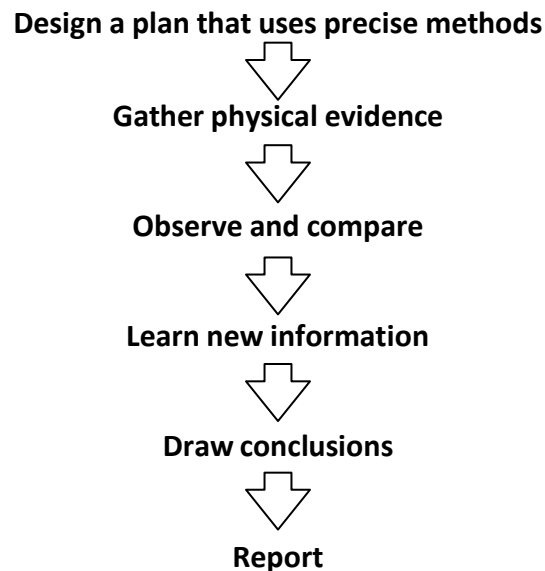
The constructs and rigor required of the biological sciences are the same for the social sciences, including in the field of evaluation.

Determining the Evaluation Question

OBJECTIVES

- Identify the specific users of the evaluation results and their needs

- Assess the purpose of the evaluation and the timeframe in which each question is answerable

- Use assessment criteria to prioritize questions according to program or project circumstances

Determining the Evaluation Question

Inquiring Minds Need to Know . . .

Before embarking on an evaluation, one of the most important considerations is to understand the needs of those requesting the evaluation—the inquiring minds. Asking the following questions can provide a "course heading" for navigating the evaluation planning process: Who *needs* this evaluation? *Why* do they need it? *What* do they want to know? *When* must they have the information? *Who* will use the results? *How* will they use it?

It is likely that you will have a long list after collecting answers to these questions, and the reality is that there is never enough time or resources to answer all the questions. To make the list more manageable, you will have to prioritize and agree upon a certain number of questions. In an ideal world, this would have already been done when the program or project goals and objectives were first established. However, in the *real* world, the evaluation questions are often developed after the fact—or—the program may have multiple goals. One way of comparing and prioritizing the number of questions is by asking each "inquiring mind" to complete the statement:

> "I need to know__(what?)
>
> by_____(date)
>
> because I need to decide_____
>
> (to make a decision affecting the program/project)."

> (Adapted from the *2002 User-Friendly Handbook for Project Evaluation* – NSF)

Prioritizing "Inquiring Minds"
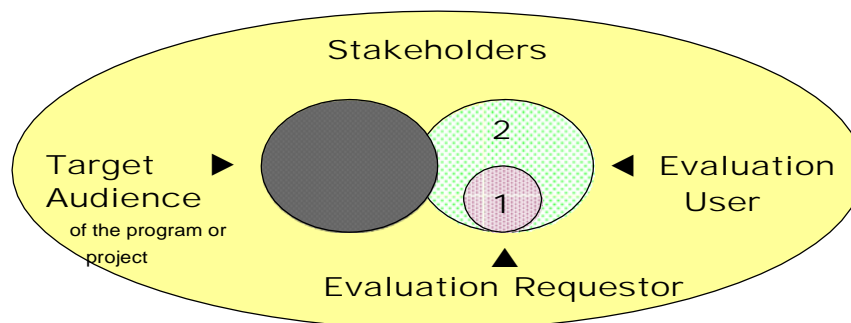
Figure 1

Within the larger universe of program or project stakeholders, there are subsets of "inquiring minds" (see Figure 1):

A select few evaluation users, termed here the **evaluation requestors,** *need to know the evaluation results to make a decision affecting the program or project*. Addressing their questions should be your number one priority. Evaluation requestors mandate or provide the impetus for evaluation and *will* read the report, using it as their basis for making decisions that can affect implementation, conduct, or continuation of the program or project. The remaining **evaluation users** may not be able to use the information right then but will find it useful later. They *may or may not* read the report and, usually, most of them do not have the authority to make decisions that can affect implementation, conduct, or continuation of the program or project. Their questions can be considered of secondary priority. The **target audience** of the program or project may include some stakeholders who are interested in the results of the evaluation.

Before agreeing to address additional requests from (other) evaluation users, consider these questions: Will it be relatively easy to collect this information or does it require additional effort? Given limited time and resources, is it in the best interest of the evaluation to answer these additional questions? It is conceivable that, even with using this process, there may be overlapping questions than can be addressed in a single evaluation effort. How do you narrow the focus?

Narrowing the Focus

There is no easy way to determine the "right" question(s) to ask. The circumstances of each effort will need to be assessed. When the range of possible questions is agreed upon, estimates can be made about the benefits and costs of answering or not answering each of them. For example, some questions may be too costly to answer. Others may require a level of expertise in evaluation that is not available to the program, organization, or agency.

By taking a comprehensive look at potential questions, all the possibilities are made explicit to those planning the evaluation, allowing them to make an informed choice. Each potential question should be considered for inclusion by whether the information it provides . . .

- Contributes to the goals of the program or project and its stakeholders

- Is useful and not currently available

- Is important to a major group or several stakeholders

- Would be of continuing interest

- Can be translated into measurable terms

- Can be obtained, given financial and human resources

Now that input has been provided, it is time to craft good critical and specific questions. What will the evaluation seek to answer? More often than not, evaluation questions are broad and vague. When presented, these questions yield broad and vague responses that are difficult to interpret and are of little use for program or project decision-making. It is worth the time and effort **now** to bring clarity and specificity to your evaluation question(s).

Are you deciding what is most meaningful to measure? On what will you spend limited time and resources?

There is no universal formula or criteria for deciding on the most appropriate evaluation question(s). However, it is useful to keep the following advice in mind when choosing or crafting your evaluation question(s):

- A few well-answered questions are much more useful to the program than attempting to measure many questions poorly.

- Keep it simple and focused. More time and more data are not necessarily required and may result in less than meaningful results and confounding variables.

- Be realistic about time, money, and expertise when narrowing the focus.

- Give high priority to questions from those who truly will *use* the results versus those who are merely interested in the results.

- Consult your program or project logic model, which contains useful information for finding and pinpointing what needs to be answered. When developed collectively, the logic model becomes a powerful tool for gaining consensus about questions.

Activity

Determining the Evaluation Question

- Use **Job Aid 1: Determining the Evaluation Question** to determine and clarify your evaluation question.

- Be prepared to share your question and why it received the top rating.

NOTES

Determining the Evaluation Question

Directions:

1. Think of those *requesting* the evaluation. Record his or her name on line "**a**."

2. For the purpose of this activity, fill in what you think s/he would want to know on line "**b**." (When doing this at work, you would provide these questions to those requesting the evaluation and record and evaluate the responses on this form.)

3. When will this person need the information? Record on line "**c**."

4. On line "**d**," record the decision s/he will make with this information.

5. Rate your ability to answer the question in "**e**" (easy, moderate, difficult).

6. Rank the relative priority of each requestor in "**f**."

7. Convert the highest-ranked response to the evaluation question.

---

e) Ability to answer

f) Relative priority

a) **Requestor of evaluation:** _____

b) **I need to know**_____

c) **By this date** _____

d) **Because I need to decide**

_____

in order to make a decision affecting the program/project.

---

e) Ability to answer

f) Relative priority

a) **Requestor of evaluation:** _____

b)   **I need to know**_____

c) **By this date** _____

 d) **Because I need to decide** _____

in order to make a decision affecting the program/project.

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a) **Requestor of evaluation:** _____

| **e) Ability to answer** |
| **f) Relative Priority** |

b) **I need to know** _____

c) **By this date,** _____

d) **Because I need to decide** _____

   in order to make a decision affecting the program/project.

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a) **Requestor of evaluation:** _____

| **e) Ability to answer** |
| **f) Relative Priority** |

b) **I need to know** _____

c) **By this date** _____

d) **Because I need to decide** _____

   in order to make a decision affecting the program/project.

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Create the Evaluation Question: Use the space below to create the evaluation question, given the relative priority of responses (this question will serve as the basis for all course activities).

Types of Evaluation

The multifaceted nature of evaluation allows stakeholders to review and assess the program or project from different angles—process, outcome, and impact. These three angles (or types) of evaluation also build on one another, allowing program and project staff members to increase their knowledge about the activities they undertake as they are able to incorporate more perspectives into their evaluation.

Process evaluation documents and analyzes the early development and actual implementation of a program or project by assessing whether strategies were implemented as planned and whether expected outputs were actually produced. This type of evaluation requires extensive information on (a) what was actually implemented (including descriptions of the program or project environment); (b) the process used to design and implement the program or project(including any changes in the types and quantities of services delivered, the beneficiaries of those services, and the resources used to deliver the services); and (c) the identification and description of other influences that may have affected implementation and outcomes, and how these were resolved.

A process evaluation seeks to answer the following questions:*

- What does the program actually consist of? How effective is the program design?
- Whom are we reaching? How does that compare to whom we targeted?
- Who participates in what activities? Who doesn't? Does everyone have equal access?
- What teaching/learning strategies are used? What seems to work—for whom?
- How effective is the staff?
- How is the program operating? What internal programmatic or organizational factors are affecting program performance?
- What resources are invested? Are resources sufficient or adequate?
- How many volunteers are involved? What do they do? Strengths? Weaknesses?
- How much does the program cost per unit of service?
- To what extent are participants, community members, volunteers, partners, and donors satisfied?
- To what extent is the program being implemented as planned? Why? Why not?
- Are our assumptions about program process correct?
- What external factors are affecting the way the program is operating?

Outcome evaluation determines how well the objectives for a program or project were met. It examines the benefits to the client during and after involvement with the program or project by looking at the short-, mid-, and long- term outcomes that result from program or project participation. An outcome evaluation seeks to answer the following questions:*

- What difference does the program make?
- To what extent was the program successful, in what ways, for whom?
- Who benefits and how?
- What learning, action, or conditions have changed/improved as a result of the program? At what cost?
- Did we accomplish what we promised? What didn't we accomplish?
- What, if any, are unintended or negative consequences?
- What did we learn?

Impact evaluation is the most comprehensive of the three types of evaluation. It examines just how much of a difference the program made, assessing longer-term changes in social, economic, and environmental conditions, as well as the long-term maintenance of the desired behavior. Usually (more) costly and time-intensive, impact evaluations also look at unintended program effects. The results often cannot be directly related to the effects of an activity or program because of other (external) influences on the target audience that occur **over time**.

An impact evaluation seeks to answer the following questions:*

- What difference does the program make?
- Who benefits and how?
- What learning, action, or conditions have changed/improved as a result of the program? At what cost?
- Did we accomplish what we promised? What didn't we accomplish?
- What, if any, are unintended or negative consequences?
- What did we learn?
- What is the net impact?

*Examples of questions for each type of evaluation were taken from self-study course on Enhancing Program Performance with Logic Models (www.*uwex.edu/ces/lmcourse/*)

There exists a common misconception that formative and summative evaluations are synonymous with process and outcome evaluations. **Formative** and **process** evaluations occur during the program's or project's early stages and focus on improving the program or project, while **summative** and **outcome** evaluations focus on what happens to the participants, community, and environment at the conclusion of the program or project, or program or project phase.

So, you may ask, what's the difference? Formative and summative evaluations relate to **intentions**—to collect data for ongoing program or project improvement (i.e. formative) or for decisions about program or project continuation or termination (i.e. summative). **Process** and **outcome** evaluations refer to the **phase of the program or projec**t being studied. Therefore, you might ask formative or summative questions at any phase of the development cycle (see Figure 2). (Adapted from Taylor-Powell, Jones, and Henert's self-study course on Enhancing Program Performance with Logic Models, 2002, University of Wisconsin-Extension, *www.uwex.edu/ces/lmcourse/.*)
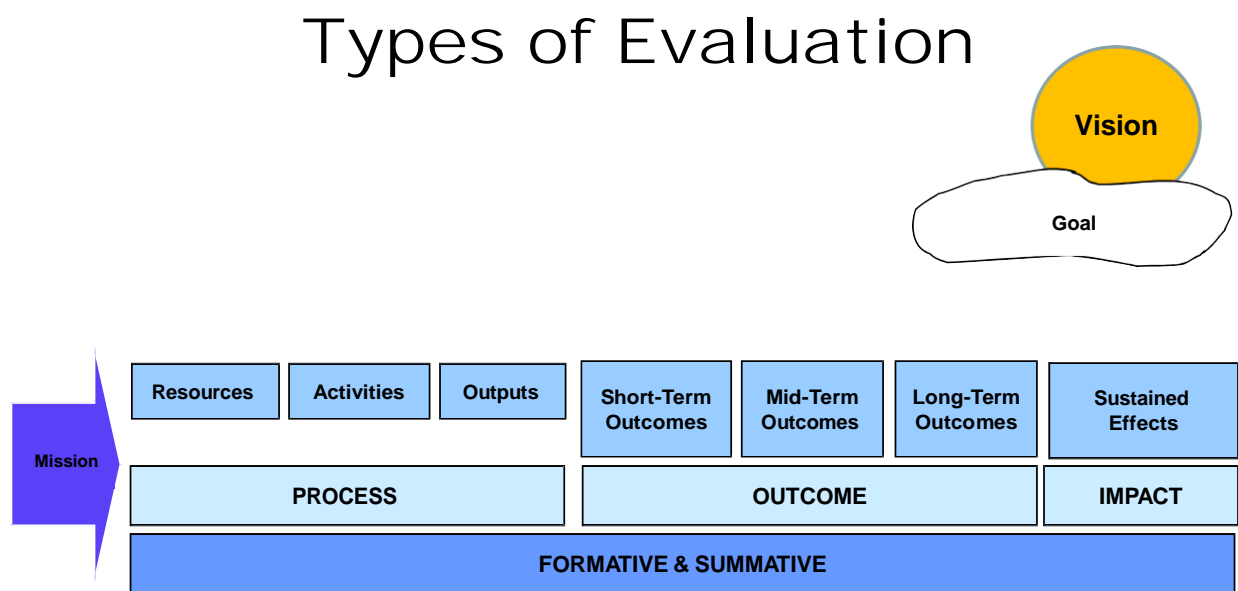
Types of Evaluation

Figure 2

Figure 3 is useful when you have a clearly defined logic model and evaluation question. It refers to the parts of the logic model you should be considering, given your evaluation question.

General Questions in Evaluation

Source: Adapted from EC 1999

http://www.emcdda.europa.eu/html.cfm/index10223EN.html?nNodeID=10223&sLanguageISO=EN
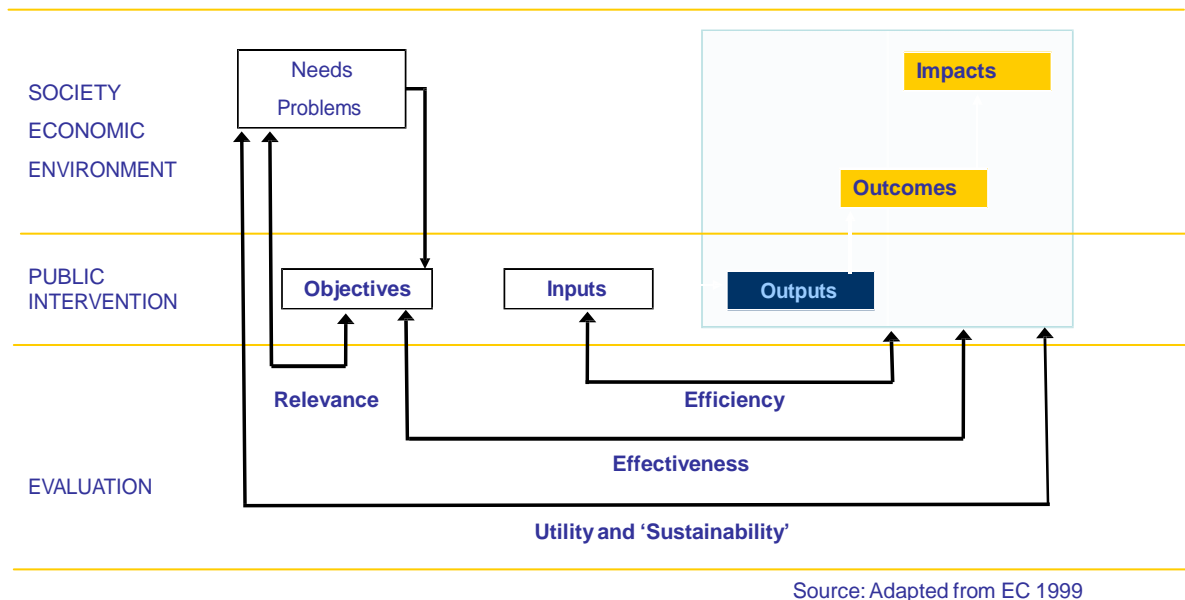
Figure 3

Defining Context

OBJECTIVES

- Create a draft context description relevant to the effort to be evaluated.

- Describe the potential uses and value of the context description.

- Review and critique a context from the perspective of an external evaluator.

Defining Context

Evaluation findings and recommendations, supported by relevant data, embedded in context, make a stronger story than one without such perspective. Context provides a richer, more detailed picture for those who are not intimately familiar with program or project activities. For example: envision a picture of a factory on a white background. Now envision the same factory in a wider shot. It's a grey day and the factory is located on the fringe of an estuary with white smoke issuing from several smoke stacks. The perceptions and assumptions one can make about these images are quite different. The first vision, without context, leaves many voids of information for the viewer to fill in. The second image provides some context, but the viewer's perception of the factory, the environmental impact of its location and effect on the surrounding ecosystem, suitability of effluent concentrations, and so on are quite different and the assumptions are far fewer.   However, these assumptions can be quite different, depending on the viewer – e.g. an industry representative or a coastal resource professional. Defining context (relevant to the evaluation question) minimizes the chance for erroneous assumptions.

Programs and projects do not exist in political, social, or cultural vacuums. Context can create a more complete picture and engender more compassionate and informed decisions based on the evaluation findings.

If your organization has done a thorough job of developing a logic model and has based the activities on documented need, you will find that much of the information described below already exists.

The context elements listed below serve merely as a guide to which you can add or modify as appropriate. This is the type of information an external evaluator should be looking for, and it will expedite her or his ability to quickly begin working productively on the evaluation. It is also a jump start on the evaluation report and provides the context needed by decision makers to better understand the results and yield informed decisions affecting the future of the program or project.

Context Elements Guide

The following elements are offered as a guide for the types of information that can be included in the description of context. The circumstances and purpose of the evaluation will determine which elements to include, which to emphasize, and if other contextual elements not listed below warrant description.

A. Existing Conditions – concisely describe the issue, program name, goal statement and mission, types of activities and role of organization, name of project(s), and description of

project(s). Describe what is or was known about the issue being addressed before the intervention. Depending on when the evaluation occurs in the life of the project, a description of the conditions during and after the project may be useful. This may include relevant attitudes and perceptions of stakeholders.

B. Drivers – *program level* – describe the impetus for the effort being evaluated; describe the mandate(s), legislation, or policy-guiding efforts (PART, 312, internal review boards); *project level* – describe the relevant results of the needs assessment; describe the problem or deficiency the activity is designed to address.

C. Output Specifics – for each activity or product being evaluated in the logic model, describe, as appropriate, the geographical influence and scope of the activity and the political, social, economic, and cultural realities.

D. Target Audience – describe what is known (or assumed) about the people participating in the project or using the product. Define specifically the population for whom the activity, intervention, or product is designed (include specifics such as demographic, sociological, geographic, psychographic, etc.)

E. Assumptions – describe why have you chosen these activities or interventions to address this issue; describe the rationale for the approach, activity, or product (cite any relevant biological, social science, or other supporting research). Do you have credible proof that "it" will work? What evidence exists that the activity is likely to cause the outcomes noted in the logic model?

F. Other – anything (not already covered) you should mention about your efforts that would be important for others to understand?

Context for the Coastal Water Toxin Reduction (CWTR) Project

The following context description is an example for the Coastal Water Toxin Reduction (CWTR) Project, given the evaluation question stated below. The context elements listed below serve merely as a guide to which you can add or modify as appropriate. This is the type of information an external evaluator should be looking for, and it will expedite her or his ability to begin quickly working productively on the evaluation. It is also a jump start on the evaluation report and provides the context needed by decision makers to yield informed decisions affecting the future of the program or project.

Evaluation Question: To what extent has the CWTR Project been successful in convincing pulp and paper mills to adopt new process technologies?

A.   Existing Conditions

1.   Program name:
"Coastal Actions Program (CAP)." The CAP is a nongovernmental organization (NGO).

2.   Goal statement and purpose:
**Goal**: Reduction of toxic effluents entering Papyrus Bay.

**Purpose**:
We strive to reduce the negative environmental impact(s) related to the release of toxic effluents into Papyrus Bay. This is accomplished by gathering the most up-to-date research, technical information, and best management practices (BMPs) related to the issue and using these as the foundation to craft appropriate projects (such as education and technical assistance) suited to targeted audience needs and that attract, motivate, and enable the targeted audience to choose or enact environmentally sensitive actions related to toxic effluents in the Papyrus Bay watershed.

3.   Overview of activities and role of organization:
The CAP operates four offices in the Bay area—one in each county. Our motto is "Educating to Action" the industries, homeowners, residents, municipal staff members, and elected officials living, operating, and governing in the Bay area.

Examples include the following:

- Public information and incentive campaigns, evening and weekend environmental socials, and volunteer opportunities for homeowners

- Technical assistance for municipal staff members with ½ day workshops (including summary briefings) for elected officials

- Training, liaison services, and technical support for pulp and paper mill owners

4. Name of project(s) considered in the evaluation:
Coastal Water Toxin Reduction (CWTR) project

5. Description of project(s):
This project seeks to reduce the amount of hazardous substances, pollutants, or contaminants entering the waste stream from area pulp and paper mills, thereby reducing the hazards to public health and the environment associated with the release of such substances. There are five independently owned pulp and paper mills in the Papyrus Bay area.

Primarily funded by the U.S. Environmental Protection Agency (EPA) Source Reduction Assistance (SRA) Grants Program

6. Stakeholders: *who has direct interest, involvement, or investment in this project and its outcome?*

Pulp and paper mill executives, employees, and clients; federal, state, and local environmental agencies; coastal protected areas; NGOs working in support of the environment; those land- or homeowners, businesses, and governing officials within the scope of Papyrus Bay; those groups in adjacent municipalities; commercial and recreational boaters and fishers; tourism boards and chambers of commerce.*

*Your list should include the specific name of each known entity at the *project* level—for example, the Lave County Tourist Development Council, the Neehsas Wildlife Sanctuary, etc.

7. *Issue: describe what is or was known about the issue being addressed before the program or project.*

Data from Bay studies indicate that pulp and paper mill effluents (containing compounds such as tri- and tetrachloroguaiacols, acetovanillone, dioxins, and furans) are being found in concentrations well above toxicity thresholds. Semiannual monitoring compared to baseline data from 20 years ago indicates an exponential increase of chemicals traditionally used in the pulp and paper mill industry. The increases in toxic effluent levels and timing are being linked to the exponential growth of the industry over the past 35 years, due to the proximity of the port and the sale of large tracts of forest from private owners to the industry.

B. *Drivers:

1. Political: *(applies primarily to programs; may include those for projects) – describe the mandate(s), legislation, or policy guiding efforts.*

State has recently proposed enacting legislation that would surpass federal water quality requirements within the next four years.

Federal funding exists for pollution reduction programs.

2. Needs Assessment:

a. *Formal Needs Assessment – note the key findings (about the issue, target audience, etc.) that will be used to shape the intervention.*

Due to the wealth of data about the current state of the industry, the needs of specific types of operations, and the motivations and barriers to installing new process technologies contained in the recent EPA reports and industry documents, no formal needs assessment was conducted for pulp and paper mills in the Bay area. See "Informal Needs Assessment" and "Justification" below.

b. *Informal Needs Assessment – note any anecdotal information that is being used to shape the intervention.*

The specific needs of the targeted pulp and paper mills will be determined through communication with local industry insiders with whom the CWTR project has a good rapport. The CWTR project verified the applicability of the preexisting information and the utility of the suggested strategies and fact sheets contained in the EPA reports. The CWTR project was contacted for "on-the-fly" assessment of any new or adapted print materials and other communication vehicles, as well as educational and technical assistance strategies.

C. *Activity Specifics: *Describe for the activities or products on which you will be focusing.*

1. Activities: *provide a brief description of the activities.*

The Coastal Water Toxin Reduction (CWTR) project activities are designed to result in pulp and paper mills choosing and installing new process technologies to prevent the production of toxic effluents. They include the following:
- Creating media to support awareness, education, and training activities
- Developing training programs that network executives of converted and traditional mills
- Providing facilitated discussions between executives of converted and traditional mills
- Providing technical advisors who can conduct on-site assessments and conversion assistance

- Researching and creating a database of available industry-appropriate incentives

2. Geographical influence and scope

The Coastal Water Toxin Reduction (CWTR) project will focus its efforts on the five existing pulp and paper mills affecting Papyrus Bay.

3. Political, social, and cultural realities

Politically the governing officials are hearing from two strongly opposed factions of the Bay area.

> One group within the community is composed primarily of newer residents (~5 years) occupying the newer homes and condos within 5 miles of the coastline, as well as commercial and recreational marine operations and tourism boards, all calling for more strict regulations, enforcement, or closure of these operations.

> The other group is composed primarily of those employed by the pulp and paper mills— a large percentage of the populace who are primarily long-time residents (10+ years) in the Bay area—who support the mills and oppose any efforts to curtail or eliminate them.

The communities are aware of symptoms via constant media coverage or direct observation and olfaction (e.g., harvest restrictions, dense and protracted algal blooms, fish kills, persistent odor, etc.). The public is engaged; there have been an abundance of letters to the editor, many citizens and homeowner groups expressing concern at county commission meetings about "pollution" entering Papyrus Bay affecting human health and tourism, as well as many speaking in defense of the stable revenue and jobs provided by the pulp and paper mills.

Pulp and paper mills are claiming there have been no changes in the way they do business and that the efforts to change or retrofit will result in expenses so high as to cause layoffs or pay stagnation and perhaps economic collapse in the Bay area.

D.   *Target Audience*: *define specifically the population for whom the activity is designed (include specifics such as demographic, sociological, geographic, psychographic, etc.)*

The target audience consists of the owners and operations managers of these mills. This group is composed of all males between the ages of 45 and 60. Most are sons or family members of the original pulp and paper mill owners in the Bay area; the mills were founded 35 years ago. All live within the Papyrus Bay area, most have school-age children, and many are recreational fishermen. The education level appears to include high school graduation to 4-year college degrees. The group has recently formed a professional organization, primarily in response to the bad publicity.

A typical plant employs 85 to 110 people and generates $3 to $8 million in annual gross revenues.

Regulatory compliance and industry approval are strong drivers for these executives. Barriers to proactive performance include a lack of capital and information, a lack of positive reinforcement, and an uneven enforcement playing field.

E.   *Assumptions: *Why have you chosen these activities to address the issue? Describe the rationale for the credibility of the activity (cite credible biological, environmental and social science research as it applies to your effort). Is there evidence that the activity is likely to cause the outcomes noted in the logic model?*

EPA has researched and documented the drivers and barriers to toxic effluent reduction in pulp and paper mill operations and documented motivational strategies that have proven effective in other areas of the United States. This project is designed to be closely aligned with and guided by this information and is following the suggestions for effectively reducing the release of toxic effluents by this industry.

EPA (Region 9, Paper Processing Pollution Prevention) also determined that an industry-specific Environmental Management System (EMS) template can help businesses implement an EMS that improves environmental performance. The template provides an implementation tool for companies developing EMS's. It was tested at small and mid-sized pulp and paper mills in California. The program focused on a wide range of subjects transferable to many facilities. Costs, raw material savings, and waste reductions were documented for each project.

Generally, each of the strategies used above was taken from the research in community-based social marketing, which has been shown to be very effective in fostering sustainable behavior (McKenzie-Mohr and Smith, 1999)

Activity

Defining Context

- Use **Job Aid 2A: Defining Context** to contextualize the program or project to be evaluated. Prioritize completion of the items marked with an asterisk (*).

- Share your context with "external evaluators."

- Evaluators – review and critique using **Job Aid 2B: Context Assessment**.

Defining Context

> **Directions**:
>
> **1.** Use the following elements to contextualize the part of the program or project pertaining to the evaluation question. Prioritize completion of the items marked with an asterisk (*).
>
> **2.** Please write clearly, because another group that will assume the role of external evaluator is going to read this.

Transfer evaluation question from Job Aid 1 here:

A. Existing Conditions

1. Program name:

2. Goal statement and purpose:

3. Types of activities and role of organization:

4. Name of project (s):

5. Description of project (s):

6. Stakeholders:

7. *Issue: describe what is or was known about the issue being addressed prior to the intervention.

B. *Drivers

1. Political (applies primarily to programs but may include projects): describe the mandate(s), legislation, or policy guiding your efforts.

2. Needs Assessment:

    a.   Formal Needs Assessment – note the key findings (about the issue, target audience, etc.) that will be used to shape the intervention.

    b.   Informal Needs Assessment – note any anecdotal information that is being used to shape the intervention.

C. *Activity Specifics
.

1.   Activity: provide a brief description of the activity.

2.   Geographical influence and scope:

3.   Political, social, and cultural realities:

D. *Target Audience

Target audience: define *specifically* the population for whom the activity is designed (include specifics such as demographic, sociological, geographic, psychographic, etc.).

E. *Assumptions

Why have you chosen these activities to address the issue? Describe the rationale for the action or activity (cite credible biological, environmental, or behavior research as it applies to your effort). Is there evidence that the activity is likely to cause the outcomes noted in the logic model?

Context Assessment

> **Directions:**
>
> 1. Share your evaluation question and context with another group that will review it as "external evaluators."
>
> 2. Client – ensure the evaluators understand the key points of the context in which the program or project being evaluated operates.
>
> 3. Evaluators – read or listen as if you have been asked to conduct an evaluation by the client; record your observations about the questions below.

A. Existing Conditions

    a. What questions still exist for you?

    b. Which information appears strong?

B. Drivers

    a. What questions still exist for you?

    b. Which information appears strong?

C. Activity Specifics

    a. What questions still exist for you?

    b. Which information appears strong?

D. Target Audience

    a. What questions still exist for you?

    b. Which information appears strong?

E. Assumptions

    a) What questions still exist for you?

    b) Which information appears strong?

F. Does the context relate to the evaluation question?

Refining Your Logic Model for Evaluation

OBJECTIVES

- Examine your own logic model and select the elements that support the priority evaluation question(s).

Refining Your Logic Model for Evaluation

Evolving from a Strategic Logic Model

Logic models have many uses: designing programs, managing programs, guiding evaluations, communicating, and replicating programs. Before designing or implementing an evaluation, it is prudent for the internal or external evaluator to assess the program or project logic model. This assessment looks for a logical description of how the program or project is supposed to work and what it is supposed to accomplish, and most importantly for *strong* causal (i.e. cause-and-effect) connections between model components. A logic model is not just a list of inputs, outputs, activities, and outcomes; it is these elements logically linked and sensibly timed with plausible outcomes resulting from the outputs.

This course presupposes participants take a systems approach to representing their programs and projects. The prerequisite for this course required you to fill in a series of content boxes representing your program or project. These boxes will form the evaluation logic model that addresses the evaluation question.

If a logic model is deficient, then corrections should be made before the evaluation. Assessing and correcting the model can be an arduous task, especially in gaining consensus among staff members and stakeholders, but the evaluation will go more smoothly and the results will be more meaningful if issues are resolved *before* the evaluation or before an external evaluator spends countless hours ($!) trying to "make sense" of the program or project.

Making adjustments in-house to create a cogent model has many benefits. Improving program or project planning and communication, reducing the cost and time involved in the evaluation, and improving stakeholder understanding of evaluation results are just a few examples.

Additionally, many of the barriers to evaluation (see section "Barriers to Meaningful Evaluation – Hiding in Your Logic Model") can be addressed by reassessment and modification of the program or project logic model. These revisions can substantially enhance the logic model's utility as an evaluation-planning tool.

Scalability – Programs vs. Projects

Evaluating a program is somewhat different from evaluating a project. First, let us distinguish the difference between a program and a project. This course defines a **program** as a collection of projects that are directed toward a common goal. Programs are ongoing efforts that respond to a communal problem (i.e., a set of recognized social, environmental, or economic deficiencies) and whose mission it is to take purposeful, organized actions to remedy the problem. A **project** is defined as a specific endeavor of limited duration undertaken to create a product or service and whose outcome(s) supports and contributes to programmatic goals.

The following example is excerpted from the *2002 User-Friendly Handbook for Project Evaluation* (NSF) page 6:

> "Within the National Science Foundation (NSF), a **program** is a coordinated approach to exploring a specific area related to NSF's mission of strengthening science, mathematics, and technology. A **project** is a particular investigative or developmental activity funded by that program. NSF initiates a program on the assumption that an agency goal (such as increasing the strength and diversity of the scientific workforce) can be attained by certain educational activities and strategies (for example, providing supports to selected groups of undergraduate students interested in science or mathematics). The Foundation then funds a series of discrete projects to explore the utility of these activities and strategies in specific situations. Thus, a program consists of a collection of projects that seek to meet a defined set of goals and objectives." (See Figures 4 and 5.)

Programs vs. Projects

Figure 4

Case Study

COASTAL ACTIONS
PROGRAM (CAP)

Goal: Reduction of toxic effluents released into Papyrus Bay

Coastal Water
Toxin Reduction
(CWTR) Project

Coastal Yards
&
Neighborhoods

Informed
Oversight Project

Target Audience:
Bay Area
Pulp and Paper Mills

Target Audience:
Homeowners

Target Audience: Municipal
staff & elected officials

Activities:
Designed to result in
mills choosing and
installing new process
technologies to prevent
the production of toxic
effluents.

Activities:
Designed to reduce
water polluting
practices.

Activities:
Designed to result in
municipalities offering
appropriate pollution reduction
incentives to CAP target
audiences.

Figure 5

Given the differences in the scale and scope between a program and project, let us now consider how that affects the evaluation of each.

Program evaluation is a larger-scale evaluation and gathers information about a collection of projects directed toward a common objective. It examines all the projects and the effectiveness of their activities in contributing to that common objective (including those activities not usually thought of as "projects," such as partnerships and capacity building). These specific data are usually "rolled up" to denote collective performance relative to more general program objectives.

Project evaluation, on the other hand, is a relatively smaller scale evaluation that occurs at a greater level of specificity and examines a selected effort, such as an activity or product, or specific project elements such as a particular strategy or methodology. The data speak directly to the performance of the effort.

Elements of the Logic Model

Any program or project in its basic form can be displayed in the form of a logic model (see Figure 6). A logic model logically links the program components (in flowchart fashion) to concisely depict how the program or project achieves its outcomes. The structure can include, but is not limited to the following:

Resources (or Inputs) – the funding, equipment, personnel, and other contributions needed to conduct activities and create outputs

Activities – those efforts or interventions designed and conducted to produce an outcome

Outputs – tangible products and services resulting from activities

Target Audience – the individual, community, system, or other unit at which an activity or output is directed. This should be a *specific* definition of the unit for which the activity or output is designed.

Outcomes – the changes expected as a result of the program or project
- **Long-term outcomes** – the expected change in social, economic, and/or environmental condition as a result of the program or project
- **Mid-term outcomes** – the plausible changes or human actions resulting from the achievement of the short-term outcomes
- **Short-term outcomes** –the expected immediate change in the issue or audience resulting from the outputs

Objectives – establish the standards of achievement in terms of some proportionate improvement in existing condition. Objectives are SMART (Specific, Measurable, Audience or issue directed, Realistic and ambitious, and Time-bound.

Goal – the result or achievement toward which effort is directed. It is broader and more general than an objective or an outcome. It may be the result of efforts that the program contributes to, but does not direct.

Coastal Water Toxin Reduction (CWTR) Project

Target Audience – Owners and managers of pulp & paper mills in the Papyrus Bay Area

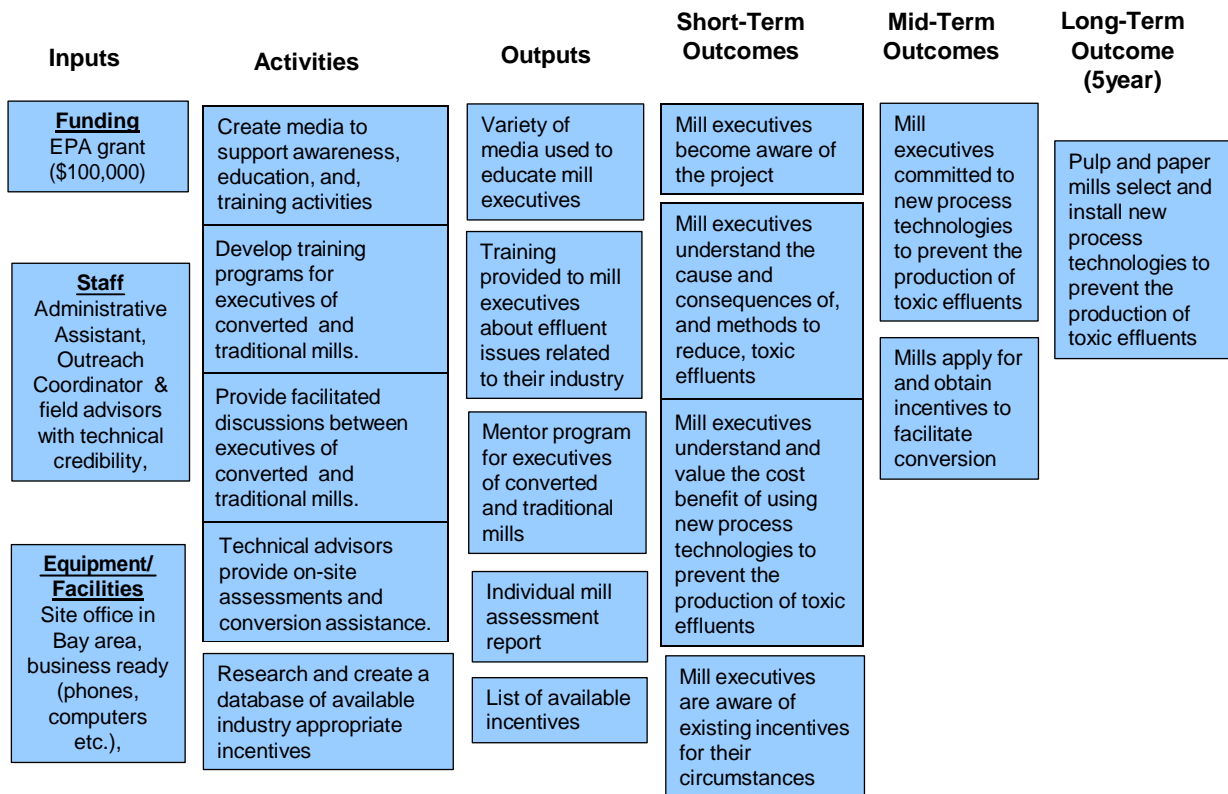| Inputs	Activities	Outputs	Short-Term Outcomes	Mid-Term Outcomes	Long-Term Outcome (5year)
Funding EPA grant ($100,000)	Create media to support awareness, education, and, training activities	Variety of media used to educate mill executives	Mill executives become aware of the project	Mill executives committed to new process technologies to prevent the production of toxic effluents	Pulp and paper mills select and install new process technologies to prevent the production of toxic effluents
Staff Administrative Assistant, Outreach Coordinator & field advisors with technical credibility,	Develop training programs for executives of converted and traditional mills.	Training provided to mill executives about effluent issues related to their industry	Mill executives understand the cause and consequences of, and methods to reduce, toxic effluents	Mills apply for and obtain incentives to facilitate conversion	
	Provide facilitated discussions between executives of converted and traditional mills.	Mentor program for executives of converted and traditional mills	Mill executives understand and value the cost benefit of using new process technologies to prevent the production of toxic effluents		
Equipment/ Facilities Site office in Bay area, business ready (phones, computers etc.),	Technical advisors provide on-site assessments and conversion assistance.	Individual mill assessment report			
	Research and create a database of available industry appropriate incentives	List of available incentives	Mill executives are aware of existing incentives for their circumstances		

Figure 6

Ideally, a concise logic model was completed during strategic planning for the program or the design phase of the project. The evaluation will proceed more smoothly and is more likely to be on track if a logic model exists that exemplifies consensus among as many stakeholders as possible. Much can be written in narrative form about a program or project, but when it is distilled into the concise text boxes and connected by the arrows of a logic model, there can be surprises and disagreement. Therefore, the development of the model requires a series of interactions so that program or project staff members and stakeholders can provide critical input and feedback. Through an iterative process of review and critical analysis, consensus can be achieved and specific evaluation priorities can be identified. Developing (or refining) the program or project logic model increases stakeholder buy-in, understanding of, and support for the evaluation, as well as the use of results. Once the model is articulated and consensus reached, design of the evaluation can begin. If the model is found lacking, outdated, or deficient in one or more areas, efforts can begin to rectify those areas before any time-consuming and expensive evaluation efforts are initiated.

Activity

Refining Your Logic Model for Evaluation

- Take out your logic model cards and only lay out those that correspond to the evaluation question.

- Affix to the place mat.

- Explain your logic model to a group of "external evaluators."

- Evaluators – Are the components clearly defined? Are the components clearly defined and linked to the evaluation question? Can you understand how the effort works and what it is supposed to be doing? Share your questions with the "client."

- Switch roles.

Barriers to Meaningful Evaluation – Hiding in Your Logic Model

Apart from the obvious barriers such as lack of funding, time, and staff members, there are four barriers within a program or project that can inhibit the usefulness of an evaluation:

1. **Lack of definition** of the problem being addressed, program outputs, intended audiences, expected outcomes, or the expected impact on the problem addressed

2. **Lack of a clear logic** of testable assumptions linking expenditure of program resources, program activities, target audiences, outputs, outcomes, and resulting impact(s)

3. **Lack of agreement** on the evaluation priorities and intended uses of the evaluation

4. **Inability or unwillingness to act** on the basis of the evaluation information

If any of the first three barriers exist, the evaluation often proves to be inconclusive or irrelevant.

If the third or fourth barriers exist, then even relevant, conclusive evaluations are unlikely to produce improvements in program performance.

Built on consensus, a cogent logic model addresses the first two problems, can facilitate decisions about the third problem, and makes it difficult for the fourth problem to persist.

To this point in the course, you have addressed the first barrier above – "the problem being addressed" and "definition of the audience" were articulated in the context. The definition of the outputs and outcomes were clarified in the last activity. In the next section, we will address number 2 above by testing and strengthening the assumptions that link one box to another in your model.

NOTES

Enhancing Plausibility

OBJECTIVES

- Recognize and describe the action(s) required to achieve relevant outcomes in your own logic model.

- Describe the assumptions underpinning own program or project to a group unfamiliar with the effort.

- Review and critique the plausibility of a logic model from the perspective of an external evaluator using credible sources and proven strategies and tools from prominent social science theories and models.

Enhancing Plausibility

Plausibility inspires trust and confidence that our programs and projects are soundly conceived, logically designed, and that our expectations of the effects are realistic. One obstacle to meaningful evaluation is **lack of a clear logic** of testable assumptions linking expenditure of program resources, program activities, target audiences, outputs, outcomes and resulting impact(s). This logic of testable assumptions is directly linked to plausibility. Plausibility asks, given what is known about encouraging people to take action regarding this problem, how likely it is that your plan will produce the anticipated outcomes?

To the trained eye of a professional evaluator or under the scrutiny of the experts in your field, is it plausible that your program or project will achieve its outcomes? Does it appear likely to be true that the effort and the assumptions underlying it will lead to the predicted outcome(s)? Thus far, your preparation for an evaluation has involved more clearly defining your efforts— the first step in determining plausibility. Now we will focus on being clear about the assumptions on which your programs or projects are based and aligning (or re-aligning) those assumptions with what social science indicates are the strategies most likely to produce the desired outcomes. These efforts can also improve the program's or project's credibility and the likelihood of positive evaluation results.

Consider the expectations of typical outcomes expressed in the models of coastal resource professionals. Outcomes, whether generated internally or externally, can sound admirable, but under the scrutiny of an evaluation, may not be plausible. For example:

- Is it realistic to expect a brochure created to stop snorkelers from standing on coral to result in a change of their behavior as an immediate outcome?

- Is it logical to state as a short-term outcome that coastal lawmakers have a greater understanding of how to minimize adverse effects of land-based activities on the coastal environment?

- Is it likely that a long-term outcome for one NGO is that the EPA and FDA adopt a performance-based approach to regulating beach and shellfish bed closures?

- Should a program whose priorities may change every 5 years (to be more congruent with the policy climate) evaluate for mid- or long-term outcomes?

Maybe, maybe not. If you answered, "It depends," you are correct. The question of plausibility asks whether *necessary and sufficient* conditions exist for a program to succeed.

According to M.F. Smith (1989), these conditions exist for a program or project if . . .

1. It intends to bring about some change

2. Its intentions are clear

3. Its planned activities are reasonable, i.e., they are of the right nature to influence the expected outcome

4. Its activities are sufficient in quantity and quality to exert that influence

5. Its resources are present in sufficient amount and type for the activities to be implemented as planned

Numbers one and two (above) are addressed in previous sections. This section will focus on helping you to determine number three and four (above) by providing an overview of some existing behavior change theories and offering a list of some strategies (based on these theories) that are supported by extensive literature to suggest that they help to change behavior.

It All Boils Down to Behavior . . . No Matter What Your Outcomes

Does all this "talk" of changing behavior apply to research projects, management actions, and policy change? Yes. No matter what your focus as a coastal resource professional (e.g., environmental education, biological research, adaptive management, or policy change), your efforts will involve getting people to take action, whether they are explicitly stated in your outcomes or not. Tacit in many outcomes is that human actions are necessary to create the desired outcome such as capacity building, maintaining partnerships, improving water quality, modifying local ordinances, or adopting alternative technologies. Although many outcomes are often stated as a change in an environmental issue (e.g., improved water quality), the effort it takes to achieve these outcomes requires human action—*people must do something to make it happen*. Your effort involves getting people to do something—whether it's to write and secure a grant, conduct credible research, or use data in their decision-making process. At some point in an evaluation, you may very well be measuring or assessing the behaviors of people and looking for a relative change in those behaviors.

If you are in fact modifying human behavior, how does your program or project go about doing that? On what assumptions, research, or theories is your strategy based? If you *can* answer the latter question, skip the next section. If you cannot answer the question, this is an opportunity to further enhance the plausibility of your effort by designing programs and projects that, as stated in number 3 above, are reasonable and therefore of the right nature to influence the expected outcome.

Expressing Underlying Assumptions

Articulating underlying assumptions is simply explaining how you think change in your target audience happens**.** One method for articulating assumptions and acquiring concrete criteria is to have staff members outline their assumptions about (1) the process participants must go through to achieve program goals and (2) what will motivate participants to go through the process. These are modeled sequentially and causally, much like your project or program logic model.

- Why do some research organizations choose a participatory or collaborative approach?

- Why do coastal training program coordinators take participants on field trips to see demonstrations of alternative technologies or best management practices?

Social science theory, research, expert opinion, previous program evaluations, and stakeholder interviews are all good sources for evidence of plausibility. Explaining how you think change in your target audience happens and comparing that to existing evidence of plausibility forces us to examine the sufficiency and potential effectiveness of our efforts. Are your plan of action, assumptions, and expectations (i.e., logic model) based on a bright idea recommended by an influential, albeit naïve stakeholder or a higher-up in the organization, or is it based on the demonstrated success of another similar effort—or perhaps it is based on a model of behavioral change? The answer speaks to the level of plausibility of your effort, which in turn, influences the likelihood of positive findings in the evaluation.

Environmental protection efforts would look to the social sciences for the theoretical frameworks that explain how to design efforts that are likely to engender pro-environmental behaviors likely to result in environmental protection. These frameworks can serve as "best practices" or the best available research to inform the design and conduct of our programs and projects. These "best practice" theories provide an increased level of assurance to program staff members, evaluators, and stakeholders that a plan of action has the potential to address *successfully* the problem and that the specified outcomes are realistic—in short, that it is plausible. The implications of the best practice theories serving as frameworks or guides for the design of our programs or projects are far-reaching in terms of funding, program credibility, stakeholder support, and plausibility of success.

Overview of Prominent Behavior Change Theories and Models

As you might imagine, the behavioral change literature is broad and deep. We have chosen to present an overview of the prominent behavioral change theories and models recommended and now being used by coastal resource professionals. To read more about any one of them, a list of references is provided in the bibliography.

Theories
1. Social Learning/Social Cognitive Theory
2. Theory of Reasoned Action
3. Theory of Planned Behavior
4. Social Marketing

Models
1. Environmental Citizenship Behavior Model
2. Stages of Change Model
3. Diffusion of Innovations

Note: some theories are formulated as guides to understanding behavior, while the models were designed as analytical frameworks to guide behavioral interventions.

1. **Social Learning/Social Cognitive Theory** – behavioral change is determined by environmental, personal, and behavioral elements. Each factor affects each of the others. For example, an individual's thoughts affect his or her behavior and an individual's characteristics elicit certain responses from the social environment. Likewise, an individual's environment affects the development of personal characteristics as well as the person's behavior, and an individual's behavior may change the environment as well as the way the individual thinks or feels. Social Learning Theory focuses on the reciprocal interactions between these factors, which are hypothesized to determine behavioral change (Bandura 1989).

2. **Theory of Reasoned Action** – assumes that individuals consider a behavior's consequences before performing the particular behavior. As a result, intention is an important factor in determining behavior and behavioral change. According to Icek Ajzen (1985), intentions develop from an individual's perception of a behavior as positive or negative, together with the individual's impression of the way society perceives the same behavior. Thus, personal attitude and social pressure shape intention, which is essential to performance of a behavior and consequently behavioral change (Ajzen 1985).

3. **Theory of Planned Behavior** – In 1985, Ajzen expanded upon the Theory of Reasoned Action (above), formulating the Theory of Planned Behavior, which also emphasizes the role of intention in behavior performance but is intended to cover

cases in which a person is not in control of all factors affecting the actual performance of a behavior. As a result, the new theory states that the incidence of actual behavior performance is proportional to the amount of control an individual possesses over the behavior and the strength of the individual's intention in performing the behavior. In his article, Ajzen (1985) further hypothesizes that self-efficacy is important in determining the strength of the individual's intention to perform a behavior.

4. **Social Marketing** – is the systematic application of an integration of marketing concepts and techniques with social science and social policy approaches to achieve specific behavioral goals with specific audiences for a social good. Andreason (1995) defined it as "the application of commercial marketing techniques to the analysis, planning, execution, and evaluation of programs designed to influence the voluntary behavior of target audiences in order to improve their personal welfare and that of their society." According to Lefebvre and Rochin (1977), five key concepts define social marketing: 1) **Consumer Orientation** – the consumer drives the research, planning, implementation, and evaluation of the project; research methods are designed to gather information to better understand the consumer's viewpoint and experience; materials are pre-tested with members of the target audience; 2) **Audience Segmentation** – large groups are differentiated into smaller, more homogeneous subgroups; motivational, cultural, and other factors that may affect the communication strategy of the campaign are determined in order to segment the audience into smaller subgroups; 3) **Channel Analysis** – the appropriate methods to reach target audience members are determined, including analysis of the best time, place, and state of mind when the target audience is most likely to pay attention and respond to the message; 4) **Strategy** – the program objective is determined and tactics are planned to achieve the objective; 5) **Process Tracking** – mechanisms to monitor program implementation are established; feedback is incorporated to redirect, revise, or refine the components of the program's implementation.

5. **Environmental Citizenship Behavior Model** – In 1990, Hungerford and Volk presented a model for "environmental citizenship behavior." The model presents three categories of variables that contribute to behavior and act in a linear fashion, albeit a complex one. The categories are 1) entry level, with a major variable of environmental sensitivity, 2) ownership, with major variables of in-depth knowledge about and personal investment in issues and 3) empowerment variables with one of the major variables being knowledge and skill in using environmental action strategies. This model is based on The Hines Model of Responsible Environmental Behavior (Hines and others, 1986/87) and the work of many others (also listed in Bibliography). More recently, Kollmuss and Agyeman (2002) have created a theoretical framework based on the above and subsequent work in the field. They

conclude that developing a model that tries to incorporate *all* factors might be neither feasible nor useful, but can help to illuminate this complex field.

6. **Stages of Change Model** – According to the Stages of Change Model (also known as the Transtheoretical Model), behavioral change is a five-step process. The five stages, between which individuals may oscillate before achieving complete change, are pre-contemplation, contemplation, preparation, action, and maintenance (U.S. Dept. of Health and Human Services, 1996). At the pre-contemplation stage, an individual may or may not be aware of a problem but has no thought of changing behavior. From pre-contemplation to contemplation, the individual develops a desire to change a behavior. During preparation, the individual intends to change the behavior within the next month, and during the action stage, the individual begins to exhibit new behavior consistently. An individual finally enters the maintenance stage once he or she exhibits the new behavior consistently for over six months (Family Health International, 2004).

7. **Diffusion of Innovations** – According to Rogers (2003), "Diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system." In other words, the study of the diffusion of innovation is the study of how, why, and at what rate new ideas and technology spread through cultures. Roger's Innovation Decision Process theory states that innovation diffusion is a process that occurs over time through five stages: knowledge, persuasion, decision, implementation, and confirmation. Accordingly, the innovation-decision process is the process through which an individual or other decision-making unit passes from (1) first knowledge of an innovation to (2) forming an attitude toward the innovation, (3) a decision to adopt or reject, (4) implementation of the new idea, and (5) confirmation of this decision. (Rogers, 2003, p. 161)

Behavioral change theories can be used to aid in the development of effective coastal resource protection efforts. The above section is presented to heighten your awareness of the more prominent models used by coastal resource professionals. For application purposes, we recommend you gain a more in-depth understanding of them by consulting the references.

Effective Tools and Strategies to Enhance Plausibility

The following tools and strategies are distilled from the above behavior change theories and models, many of which are summarized in Martha C. Monroe (2003). Monroe indicates that studies have shown that each of these tools has the capacity to work. When implemented effectively, each may be used to help change behavior and facilitate environmental literacy. The likelihood of the success of a program or project can increase greatly by incorporating a combination of the following into its design.

1. Carefully identify the desired behavior and understand the benefits and barriers as *perceived by the audience.*

2. Reduce barriers to a level more easily overcome.

3. Use specific information.

4. Provide consequences of actions (both positive and negative).

5. Provide benefits of consequences (of positive actions) to the *audience* (not the trainers).

6. Use models, case studies, and examples (case studies are especially important when dealing with complex skills such as problem identification and higher order thinking skills). This is especially useful when followed by a group activity to work on its own case or issue.

7. Participants engage in project-based problem solving and work toward their resolution.

8. Make connections between and among the various aspects of an issue or action plan to more thoroughly understand the choices and consequences.

9. Profile success stories and opinion leaders who have adopted the behavior.

10. Communicate that the community (professional, etc.) accepts and applauds the behavior.

11. Provide feedback on examples of any positive behavior now underway.

12. Practice the behavior with the safety and support of a peer group.

13. Acquire and practice action skills.

14. Conduct activities that extract a commitment from people, either in writing or verbally.

Durable behavior, which is the result of effortful information processing, is more achievable when cognitive involvement is high, arguments are strong, sources are credible, topics are relevant, message is clear, distractions are few, and comparisons are favorable.

Behavioral Change Theories and Models in Evaluation

An evaluation may involve an assessment of plausibility and subsequent search for implementation of those tools and strategies presented (see section "Effective Tools and Strategies to Enhance Plausibility"). Being clear about your assumptions, and using the social sciences to inform efforts to modify behavior have many benefits, they can lead to a more effective and efficient evaluation, increase credibility with the evaluation user and other stakeholders, increase the plausibility of achieving outcomes, serve to corroborate evaluation findings, and increase the likelihood of positive findings. This approach will keep an organization from making implausible assumptions such as employing ecosystem management efforts in top-down, government-mandated, expert-driven approaches, and designing outreach efforts that strive to increase knowledge with the expectation that it will result in better environmental quality. Nevertheless, what if, in spite of our best efforts, the evaluation findings are negative or null? "That we do not see widespread movement toward new behaviors, speaks to the possibility that we aren't measuring behavior with a detailed enough instrument, that we don't yet know everything about human behavior and change, that we are not employing these strategies often or effectively enough, or that these strategies are weaker than the barriers and countervailing forces" (Monroe, 2003).

The explicit or implicit intent of environmental protection and conservation requires human actions. Understanding behavior lends insight to the formulation of plausible and potentially effective methods for achieving outcomes—no matter how they are stated. In an era when coastal resource protection programs are being held to a higher level of accountability, the designers of these programs or projects must increasingly strive to implement *plausible* behavior change strategies and tools in order to demonstrate achievement of coastal resource protection goals.

Timelines

Quite frequently, timelines are established for the implementation of programs or projects, but not for when we can expect to see evidence of the intended outcomes—especially the mid- and long-term outcomes. These outcomes may be part of a 5-year strategic plan, but is it possible to achieve those mid-term outcomes in 5 years? Is it possible to achieve the long-term outcomes in 10 years? Once it is plausible that the outputs will result in the outcomes, it is important that realistic timelines be established.

Benefits of Setting Timelines for the Entire Logic Model

- Setting timelines for the logic model indicates the type of evaluation (e.g., process, impact etc.) that is appropriate on a given date
- If the type of evaluation is predetermined, it can be conducted at a time when there is likely to be evidence and not before.
- Appropriate expectations are created about what can be answered and when from looking at the timeline in relation to model components.

As expected it's easiest to come up with a timeframe for short-term outcomes, but it gets more challenging as we move toward mid- and long-term outcomes. We need to be realistic when setting a timeline; however, it may be quite difficult to forecast just when outcomes will be evident. Think of the development of timelines as an iterative process—constantly being informed by program or project feedback. If the activity or product is modeled after others, how long did those efforts take to achieve results? Establishing a timeline congruent with your logic model creates realistic expectations for all involved: managers, program or project staff members, evaluator, funder, target audience, and other stakeholders.

Two things are certain, especially when dealing with human behavior: 1) change will take longer than you'd like or predict and 2) there are a number of influences, within and out of your control, that can hamper or help your efforts. This section has dealt with improving the efficiency of your efforts to redirect human actions. In the next section, we will identify those "other influences" and consider the role they play in evaluation.

Activity

Plausibility Assessment

- Share an activity and outcomes that pertain to your evaluation question with "external evaluators."

- Evaluators – identify the tools and strategies used in the clients' activity using **Job Aid 3: Plausibility Assessment**.

- When finished, reverse roles.

Plausibility Assessment

Directions:

1. Refer to the "chain" of your logic model that is linked to your evaluation question.

2. Choose one behavioral outcome and record it below.

3. Provide this worksheet to another group of "external evaluators."

4. As clients, explain to them in detail the activity or product (from your logic model) that creates the outcome(s).

5. Evaluators – check the boxes when there is evidence that the tools and strategies below are being employed in the activities. Ask questions and use your best judgment when choosing to check a box.

Behavioral Outcome:

Do the activities undertaken to achieve the outcome . . .

	Indicate the desired behavior?
	Indicate understanding of the benefits and barriers (to that behavior) as *perceived by the audience*?
	Reduce barriers to a level more easily overcome?
	Use specific information?
	Provide consequences of actions (both positive and negative)?

	Provide benefits (to the target audience) of consequences of positive actions?
	Use relevant models, case studies, and examples?
	Engage the target audience in project-based problem solving and work toward resolutions?
	Make connections between and among the various aspects of an issue or action plan to more thoroughly understand the choices and consequences?
	Profile success stories and opinion leaders who have adopted the behavior?
	Communicate that the "community" (municipal, professional, etc.) accepts and applauds the behavior?
	Provide feedback on examples of any positive behavior now underway?
	Enable the target audience to practice the behavior within the safety and support of a peer group?
	Enable the target audience to acquire and practice the action skills needed to demonstrate the behavior?
	Extract a commitment from the target audience, either in writing or verbally?

NOTE: This checklist is to be used only as a guide to strengthen the quality of the activities or product and improve the plausibility of achieving outcomes. Many other factors, such as timing and effectiveness of implementing strategies, are involved in enhancing plausibility.

Is the timeline…

❑ incomplete, unrealistic, and unfounded?

❑complete, realistic, and unfounded?

❑ complete, realistic, and well founded?

Identifying Other Influences

OBJECTIVE

Identify those influences, from within and outside your program or project, that can help or hinder the implementation or outcomes of the effort to be evaluated.

Identifying Other Influences

Other forces or influences act on our planned efforts that may **help or hinder** them. There are two types.

Internal (program) influences are those factors over which the program **has** control—for example, how an activity or product is advertised, a sampling design, program funding, or the nature of an incentive.

External (non-program) influences are those influences on your efforts over which you have very little or no control—for example, competing events are offered at the same time, weather-related events, ordinance, policy or code changes, and events that modify public perception are just a few.

For Better or Worse

Your program or project logic models usually involve diagrams of boxes linked by arrows representing cause-and-effect relationships. It is perhaps tempting to consider these causal models to be like wiring diagrams, in which, if we flick a switch at the first box in the diagram, it will cause the lights in the other boxes to illuminate (Rogers, 2000). Yet we know that few programs or projects operate under such simple cause-and-effect relationships.

We must recognize that these models must be based on a recognition that other factors may influence, for better or worse, the achievement of intermediate and long-term outcomes. The further away from actual program or project outputs one moves, the weaker the program's influence becomes and the greater the other influences become (see Figure 7).

Effect of Other Influences

Target Audience → **Short-term Outcome** → Other Influences → Mid-term Outcomes → **Other Influences** → Long-term Outcomes → **Other Influences**

Strongest possible cause/effect relationship due to minimal time and other influences

Weaker possible cause/effect relationship due to increased time and other influences

Weakest causal link due to extended time & other influences
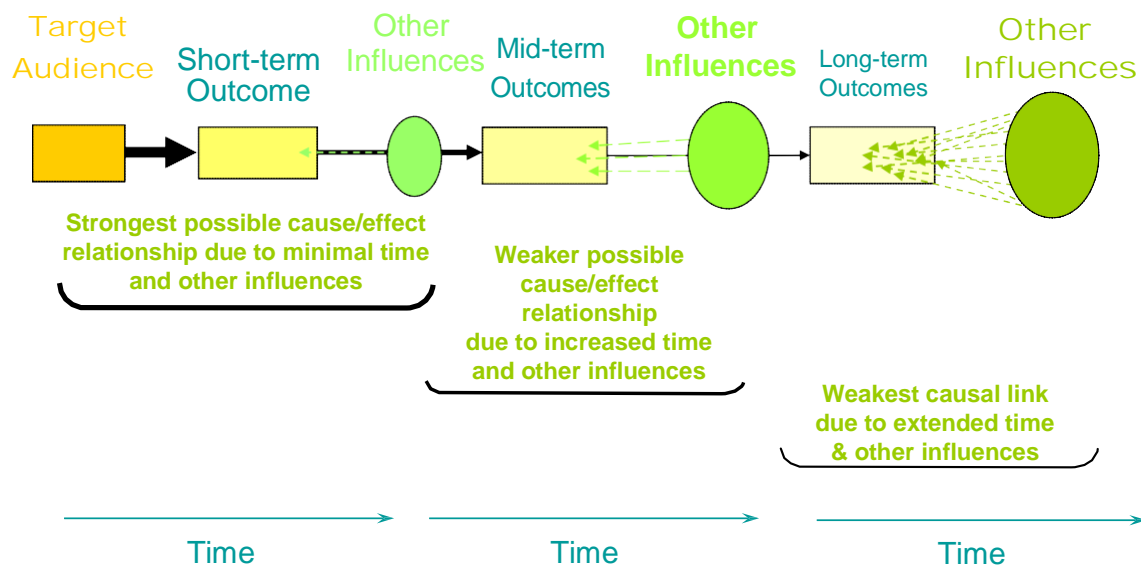
Time   Time   Time

Figure 7

Those outside influences or non-program factors (not attributable to the program or project) can be fixed characteristics or events that happen before a targeted participant (customer or client) begins the program or project, or they can occur at the same time or after the program or project and either help or hinder its efforts or outcomes. Other influences *can* be represented in the program or project logic model.

An example at the program level:

Other Influences:
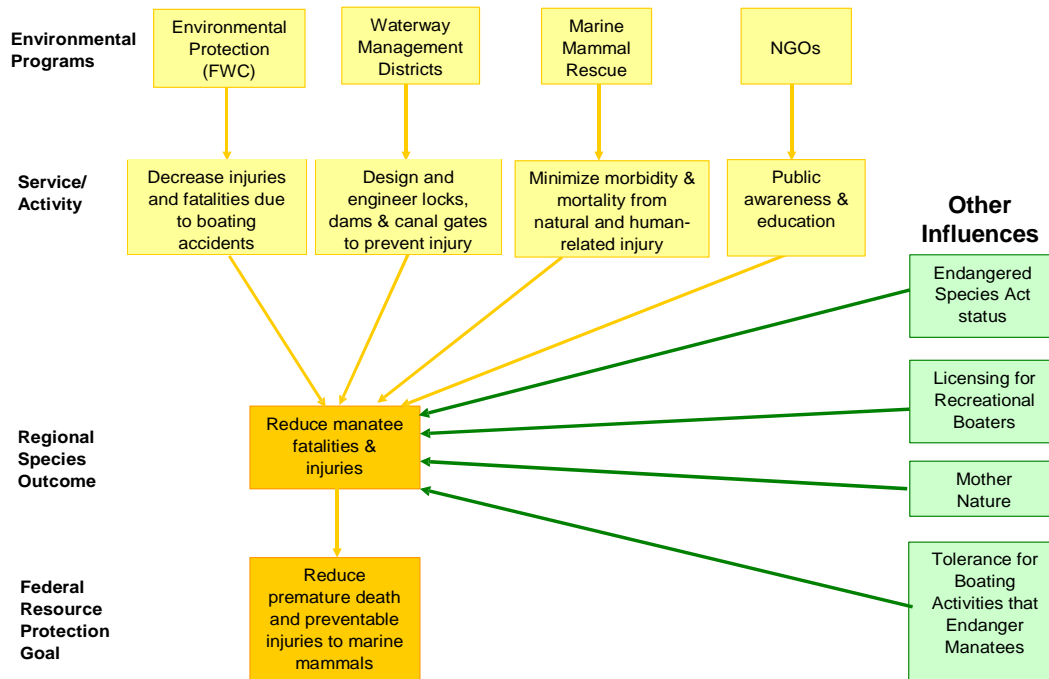## Reducing Manatee Accident, Injury, and Death

Figure 8

In Figure 8, we can see that the "Regional Species Outcome" category has a desired outcome of reducing manatee fatalities and injuries. The boxes to the right suggest the "Other Influences" (without distinguishing program and non-program factors) that could work for or against the outcome for reducing manatee fatalities and injuries. Documenting other influences affecting the program is necessary when considering the range of factors to which the outcomes are subject. This will help determine the degree to which program or project activities are attributable to outcomes.

An example at the project level:

Example of Other Influences
CWTR Project

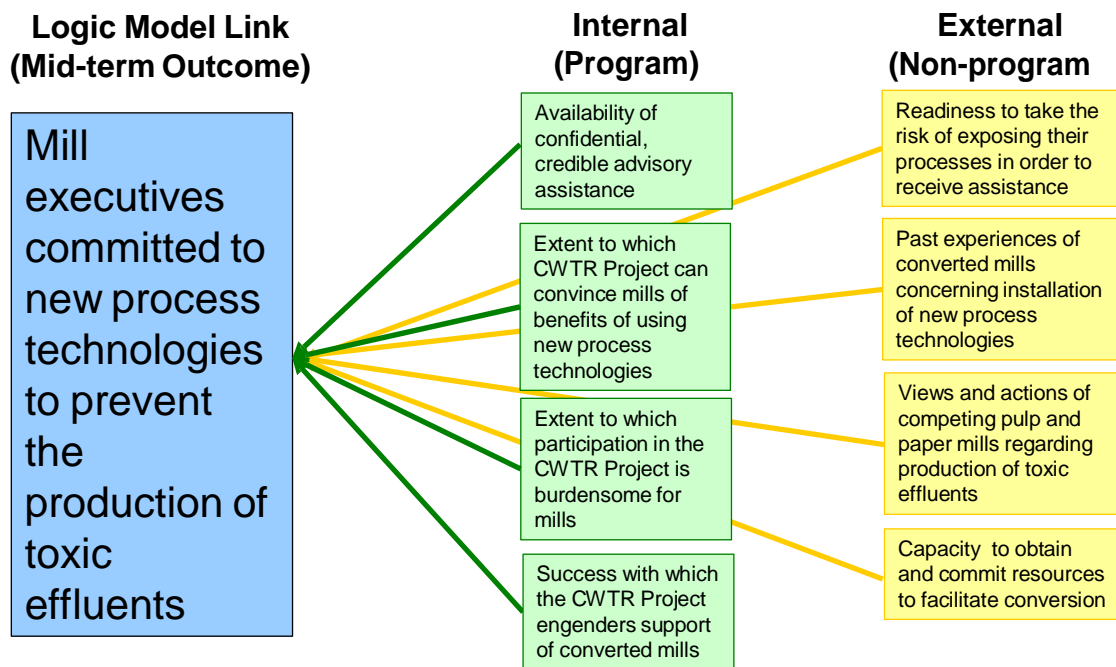| Logic Model Link (Mid-term Outcome)	Internal (Program)	External (Non-program
Mill executives committed to new process technologies to prevent the production of toxic effluents	Availability of confidential, credible advisory assistance	Readiness to take the risk of exposing their processes in order to receive assistance
	Extent to which CWTR Project can convince mills of benefits of using new process technologies	Past experiences of converted mills concerning installation of new process technologies
	Extent to which participation in the CWTR Project is burdensome for mills	Views and actions of competing pulp and paper mills regarding production of toxic effluents
	Success with which the CWTR Project engenders support of converted mills	Capacity to obtain and commit resources to facilitate conversion

Figure 9

In the previous example (Figure 8), the other influences that could work for or against the outcome were listed. In Figure 9, they have been separated into internal (program) and external (non-program) influences. This level of specificity provides a more detailed accounting of how other influences can help or hinder the achievement of success.

Categories to Guide Definition of Other Influences

These categories merely provide a starting point to jump-start your thinking about the types of other influences that may affect your program or project level efforts.

- **Mandates** – those rules, laws, codes, policies, and other instruments that guide program and project actions and human behaviors

- **Regulations** – the specific requirements of those mandates affecting the target population

- **Alternatives** – other choices your target audience has or could have available to them that would cause them to choose differently

- **Socio/cultural** – the prevailing attitudes and beliefs of your target audience regarding your efforts or your organization; do other groups in the community have differing perceptions and or values related to the effort or issue?

- **Mother Nature** – meteorological events affecting target audience participation, the development or implementation of the activity, or the application of new knowledge, skills, or attitudes

- **Resources** – the availability of funding, equipment, services, or personnel and the effects on program or project implementation

Activity

Identifying Other Influences

- Review your evaluation question, context, and logic model "chain."

- Fill in the other influences affecting your logic model "chain" by completing **Job Aid 4: Identifying Other Influences.**

- Be prepared to share some of these with the class.

Identifying Other Influences

Directions:

1. Review your evaluation question, context, and the related logic model "chain."

2. Discuss with your team and record the other influences affecting the evaluation question.

Other Influences	Internal	External	Link to Logic Model
Mandates			
Regulations			
Alternatives			
Socio/cultural			
Mother Nature			
Resources			

Creating Effective Performance Measures

OBJECTIVE:

Create effective performance measures that support the evaluation question, specifically identify the source(s) of data, and assess the effectiveness of the performance measures of others.

Creating Effective Performance Measures

Your program has a context that needs to be described, and your logic model is nested in and reflects the context. There can be many influences on the plausibility of the logic model and many different kinds of questions (as indicated by the different elements in the logic model). In our context, we are most likely to focus on questions that lend themselves to the use of performance monitoring to answer them.

Known by many different names (performance indicators, performance objectives, and metrics), performance measures are objective, quantitative indicators of the extent to which the program is meeting numerical objectives. They indicate if intended progress is being made but do not indicate why or why not. A complete program or project evaluation or evaluation research is needed to make such a determination.

Most coastal professionals interested in learning about the effectiveness of their programs and projects measure this by observing changes in the audience or the issue. By focusing on performance measures, program and project staff members can document and report their observations to know what is or is not occurring. Performance measures are not evaluations, but they are tools that help identify what may need to be evaluated or when evaluation is needed.

Performance measurement is, however, an essential part of the evaluation activity. It is the principal tool for formative evaluation designed to provide feedback for program or project improvement. Performance measurement systems are particularly helpful for a new program or project trying to establish itself. Adequate process monitoring (the way the program or project is designed, developed, and implemented) is an important complement to impact evaluation. It can help to identify when the process, not the program or project, is faulty and allow for correction. However, its utility is limited in summative evaluation, where much more data are needed to support conclusions regarding causation and impact.

Performance indicators are often seen as a substitute for program evaluation. Performance indicators simply require the collection of outcome data, typically without an evaluation design and without regard to mediating variables, to reach a conclusion about the success of a program. This approach usually does not measure the relationships among program components, promotes easy-to-measure constructs rather than valid ones, does not provide linkages to standards, and often makes uncritical assumptions attributing outcomes to the program (Bickman, 2000).

Management information systems (MIS) often rely on performance measures to keep track of programs and projects. However, if the performance measures being collected are

inappropriately focused, they can diminish the quality of the data being reported by the MIS and its usefulness for program or project accountability. This can occur for several reasons:

- Performance measures being collected are focused on resources/inputs, processes, and activities for lower-level outcomes, ignoring those for higher-level outcomes.
- Performance measures being collected are centered on program or project inputs, processes, and outputs—and not on outcomes.
- Performance measures being collected are not linked to explicit criteria that clearly describe what is being measured, and to a standard for evaluating performance.

Meaningful performance measures are created by defining tangible evidence related to the evaluation question in measurable terms (actions, numbers, and or comparisons).

<div align="center">

Tangible Evidence
<u>+ Actions, Numbers, Comparisons</u>

= Performance Measures

</div>

Defining Tangible Evidence

A change of perspective is useful in this situation. Imagine that you are a visitor or an external evaluator who knows very little about your effort; from this perspective you are looking for proof—tangible proof that will serve as evidence. Ask yourself and other stakeholders the following about the outcome:

- What does it look like?
- What's happening?
- With whom?
- How often?

The answers to these questions will point the way to the data that will need to be collected— the performance measures.

Many times, outcomes (as usually stated in a logic model) do not provide enough specificity to create meaningful performance measures. Tangible evidence more clearly articulates a program's or project's vision of what success looks like. It is important that the evidence chosen is explicit, depicting a definitive picture of success. Well-defined tangible evidence acts as a stepping stone on the path to performance measurement, making the selection of meaningful performance measures a much easier task. Additionally, identifying and defining tangible evidence helps program or project staff members avoid measuring components that are easily measured but that do not necessarily contribute to answering the evaluation question.

In Figure 10 (below), the tangible evidence indicates how the program management and staff of the Coastal Water Toxin Reduction (CWTR) project would like to see the broad mid-term outcome—"commitment to adopting new process technologies"—manifested in the behavior of mills with which the project is working. The key word is "commitment." We cannot see commitment, but we can hear or, more definitively, see and touch evidence of commitment. The tangible evidence in this case is proxy indicators of commitment—specifically indicators of commitment to adopting new process technologies. The CWTR project has defined the actions that are indicative of an inclination to adopt new process technologies. The evaluation may yield results that are more meaningful by establishing a range of evidence—from actions that indicate first steps to actions that indicate accomplishment of the outcome. If the outcome is not achieved, it may be possible to show progress in that direction.

Coastal Water Toxin Reduction (CWTR) Project

Evaluation Question:

To what extent has the CWTR project been successful in convincing pulp and paper mills to adopt new process technologies?

Mill executives committed to new process technologies to prevent the production of toxic effluents

Agreeable solutions were identified during meetings between CWTR advisors and traditional mill executives

Ongoing participation of both traditional and converted mill executives in mentor program

Preparation of action plans that detail conversion to new process technologies

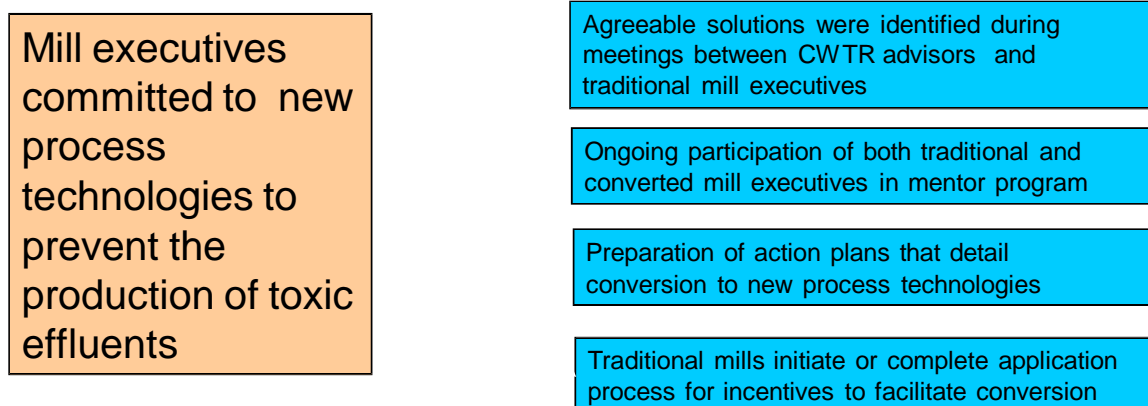Traditional mills initiate or complete application process for incentives to facilitate conversion

Figure 10

Performance Measures, Tangible Evidence, and SMART Objectives – Their Relationship and Function

If you have SMART objectives you have defined (S)pecific, (M)easurable, (A)udience- (or issue)-centered, (R)ealistic, and (T)ime-bound intentions for each component of your logic model. However, if SMART objectives were not defined prior to this course, identifying tangible evidence can be an easy and helpful first step to creating a definition of what success (literally) looks like, which in turn will increase the efficacy of your performance measures (see Figure 11 below). Tangible evidence and SMART objectives are closely related. Tangible evidence represents a subset of SMART objectives and can be a useful way to get started generating worthwhile performance measures. Can you use your SMART objectives for developing the evaluation plan? Perhaps. First, you must determine your specific evaluation question (see section "Determining the Evaluation Question"). If there are preexisting SMART objectives that are relevant to the evaluation question and support the data needed, then the SMART objectives can be used and there may be no need to define tangible evidence.

Logic Model Link: Mill executives committed to new process technologies to prevent the production of toxic effluents

Tangible Evidence of Commitment

Agreeable solutions were identified during meetings between CWTR advisors and traditional mill executives

Ongoing participation of both traditional and converted mill executives in mentor program

Preparation of action plans that detail conversion to new process technologies

Traditional mills initiate or complete application process for incentives to facilitate conversion

Performance Measures

% of traditional mills participating in the CWTR Project that find the proposed solutions agreeable

% attendance of traditional and converted mill executives in mentor program over a 10 month period

% of traditional mills that prepare action plans within the time frame and planning guidelines of the CWTR Project

% of traditional mills that have initiated or completed the application process for incentives to facilitate conversion

% of traditional mills that receive incentives to facilitate conversion

Figure 11

Effective Performance Measures

Effective performance measures should be all of the following:

Direct – A performance measure should measure as directly as possible what it is intended to measure. For example, if the outcome being measured is installation of new process technologies by pulp and paper mills, then the best indicator is the number of mills installing new process technologies.

Specific – Performance measures need to be stated so that anyone would understand them in the same way, as well as the data that are to be collected. For example, if the performance measure being collected is the reduction in toxic effluents produced by pulp and paper mills, we do not know specifically which compounds are to be measured, the percentage reduction, and in what time period.

Useful – Performance measures need to help us understand what it is we are measuring. This can be accomplished by measuring over time, against targets, across units, against benchmarks, or whatever is meaningful to your project or program. The performance measure should provide information that helps us understand and improve our programs and projects.

Practical – Costs and time involved in data collection are important considerations. Though difficult to estimate, the cost and time involved in collecting data for a performance measure should not exceed the utility of the information collected. Reasonable costs, however, are to be expected. Also worthy of consideration—will the data be available during the proposed collection timeframe?

Culturally appropriate – Performance measures must be relevant to the cultural context. What makes sense or is appropriate in one culture may not be in another. Test your assumptions beforehand.

Adequate – There is no correct number or type of performance measures. The number of performance measures you choose depends on what you are measuring, the level of information you need, and the resources available. Often more than one performance measure is necessary. More than five, however, may mean that what you are measuring is too broad, complex, or not well understood. Performance measures need to express all possible aspects of what you are measuring: the possible negative or detrimental aspects as well as the positive. Consider what the negative effects, or spin-offs, may be and include performance measures for these.

Adapted from Taylor-Powell, Jones, and Henert, 2002, Enhancing Program Performance with Logic Models.

Types of Performance Measures

Although there are more, the following categories of performance measures are common throughout the literature and should be considered when planning, monitoring, and evaluating for results:

Examples for each category refer to the Coastal Water Toxin Reduction (CWTR) project.

Input measures denote the various resources that go into a program and its activities in order to produce an output
Examples: staff time; funding

Output measures represent the number of products or services produced by the program
.Example: number of pulp and paper mills assessed by technical advisors

Efficiency measures relate the quantity of resources/inputs used to provide each unit of output
Examples: number of staff members, time and cost of visit per follow-up advisory visits

Service Quality measures correspond to the quality of outputs or the degree of customer satisfaction
Example: number of mill executives referring others to the CWTR project

Outcome measures represent the effectiveness of the program in achieving its proposed outcomes
Example: percentage of mills that apply for and obtain incentives to facilitate conversion

Some activities and outcomes can be measured **directly**:

Activity	Performance Measure
Offer and undertake follow-up advisory visits	Number of follow-up advisory visits made

Outcome	
Mills apply for and obtain incentives to facilitate conversion	percentage of mills that apply for and obtain incentives to facilitate conversion

Other outcomes have to be measured **indirectly** when cost, complexity, or timeliness prevents direct measurement. In cases such as these, there may be other measures (proxy or surrogate) that can still reveal a trend in performance.

Outcomes	**Performance Measure**
Production of toxic effluents prevented (cannot directly measure prevention, because it hasn't happened)	Percentage of mills where no toxic effluent pollution violations found
Mill executives committed to new process technologies to prevent the production of toxic effluents (How can you measure commitment? See section "Defining Tangible Evidence")	Number of mill executives actively participating in mentor program

Activity

Creating Effective Performance Measures

- Use **Job Aid 5: Creating Effective Performance Measures** to create or revise your performance measures and record the source of data for each measure.

- Share your performance measures with "external evaluators."

- Evaluators – review and critique using **Job Aid 6: Performance Measure Assessment**

Creating Effective Performance Measures

Directions:

1. *If you need to*, create a statement of tangible evidence using the following prompts:
   a. What is physical or concrete evidence of this outcome?
   b. "What does that look like/what's happening"

   Reference your tangible evidence and "Effective Performance Measures." Add to this statement the actions, numbers, and comparisons that make it quantifiable and record next to Performance Measure.

   OR

   If you have **SMART objectives**, reassess them based on the evaluation question and make revisions or create new ones.

   OR

   If you have performance measures, check them against the criteria for "Effective Performance Measures". Revise as needed, and record below.

2. Record "sources" - from where will you gather this information? What people, organization, information system, materials, events, and so forth will provide the information you need?

Logic Model Link:

Tangible Evidence:

Performance Measure:

Source(s):

_____

Logic Model Link:

Tangible Evidence:

Performance Measure:

Source(s):

Logic Model Link:

Tangible Evidence:

Performance Measure:

Source(s):

Logic Model Link:

Tangible Evidence:

Performance Measure:

Source(s):

Logic Model Link:

Tangible Evidence:

Performance Measure:

Source(s):

Performance Measure Assessment

Directions:

1. Exchange Job Aid 5 with "external evaluators."

2. Evaluators – use this checklist to assess the effectiveness of one to three of your clients' performance measures.

3. Revise your own measures as appropriate.

1 = needs improvement 2 = good 3= exemplary	Evaluation Question:
PM1 PM2 PM3	**Effective Performance Measures (PM)**
	Direct – Does it measure as directly as possible what it is intended to measure? For example, if the outcome being measured is installation of new process technologies by pulp and paper mills, then the best indicator is the number of mills installing new process technologies.
	Specific – Is it stated so that anyone would understand it and the data that are to be collected? For example, if the performance measure being collected is the reduction in toxic effluents produced by pulp and paper mills, we do not know specifically which compounds are to be measured, the percentage reduction, and in what time period.
	Useful – Does it help you understand what it is they are measuring? The performance measure should provide information that helps us understand and improve our programs and projects.
	Practical – Do the costs and time involved in data collection appear reasonable? Though difficult to estimate, the cost of collecting data for a performance measure should not exceed the utility of the information collected.
	Culturally appropriate – Is it relevant to the cultural context? What makes sense or is appropriate in one culture may not be in another**.
	TOTAL

Data Analysis Considerations

OBJECTIVE

Select appropriate data collection methods based on the evaluation question, performance measures, and an understanding of analysis considerations, quantitative and qualitative methods, and triangulation.

Data Analysis Considerations

Without question, high-quality usable data are needed to make any evaluative effort a success. It is very important to consider specific data that are needed and the source from which they will be obtained. Sound collection methods and appropriate data measures and testing are the foundation for giving your evaluation true meaning. The evaluator must consider a number of elements, including the specific information needed to measure the intended outcomes. Once data needs have been determined, there is the question of where and how to obtain such data. In many instances, data on a particular subject area already exist. If there are current data focused on the evaluation interests, the evaluator must check how recently the information was collected, the means in which it was collected, if it comes from a reliable source (quality issues), and if the depth of the information is suitable. In instances where needed information does not exist, a data collection strategy must be developed. This strategy encompasses issues, such as the intended evaluation approach, ensuring data are representative of the greater population, what type of collection methods are most appropriate, and the scope or extent of needed information. The following section describes, in detail, a number of these items.

What Can I Do with What I Have?

Collecting information provides us with valuable feedback that provides different levels of utility to our program or project. There is a continuum that ranges from no feedback to highly controlled and structured feedback. For example,

> **Coastal Water Toxin Reduction (CWTR) project – advisory program targeted at pulp and paper mills to reduce their polluting practices.**

No feedback – report nothing.

Anecdotal – report skewed or limited information; not systematically collected.
Example: one of the mills enrolled in the project submits a letter to project advisors extolling the virtues of the project.

Performance Monitoring – collect systematically to report on what is happening.
Example: report percentage of mills that apply for and obtain incentives to facilitate conversion

Evaluation – systematically collect to report on the cause of what is happening.
*Example: 75% of pulp and paper mills in the Papyrus Bay area have installed new process technologies **because** there is a tax credit associated with the installation of those new technologies.*

Evaluation Research – systematically collect to report on whether what is happening is attributable to our efforts.
Example: establishing a test group (exposure to project) and a control group (no exposure to project). Upon further investigation, determining that of the 75% of target businesses that have installed new process technologies, only 3% were exposed to the Coastal Water Toxin Reduction (CWTR) project—which indicates that the documented change is not attributable to that project and its efforts.

Linking Behavior to Kirkpatrick's Four Levels of Evaluation

There are a number of levels on which to evaluate a program or project. Each of these levels provides slightly different information about the effect of a program or project, from the simplest and most immediate (reaction) to the long-term, more complex (return on investment). Originally developed in 1959 for the evaluation of training and learning, these levels can be used to make explicit what the type questions the evaluation is asking.

Kirkpatrick's Four levels of evaluation

According to Donald Kirkpatrick's model, there are four levels of evaluation: reaction, learning, behavior, and results. Evaluation should always begin with level one and then, as time and budget allow, should move sequentially through levels two, three, and four. Information from each prior level serves as a base for the next level's evaluation. Thus, each successive level represents a more precise measure of the effectiveness of the (training) program or project but at the same time requires a more rigorous and time-consuming analysis (Kirkpatrick, 1994).

Level 1. Reaction – What is the audience's response to the program or project?

Level 2. Learning – What did the audience learn?

Level 3. Behavior – Did the audience's learning affect its behavior?

Level 4. Results – Did the behavior change move the original situation toward the objective (desired outcome)?

A fifth level of evaluation, return on investment, was later added by Jack Phillips and is now considered a component of the Kirkpatrick model (Stoel, 2004). In many cases, this is an important level for program or project evaluations.

Level 5. Return on Investment (ROI) or Cost-Benefit – Is the cost of implementing this program or project reflected in the degree of benefits received from the results?

Note: It is important to note that although these methods are presented in a hierarchy of increasing complexity, that hierarchy does not indicate relative value. All of these levels are useful. Which one(s) you use should be determined by what type of information is needed to evaluate the program or project accurately.

Level 1. Reaction or Satisfaction*

Reaction evaluation measures the audience's immediate positive or negative response to the program or project. This is the most common level of evaluation.

Often referred to as "smile sheets," they ask participants to rate their perceptions about the quality and impact of the specific program or project. These evaluations can range from a handful of questions regarding the program or project delivery, facility, or usefulness, to forms that ask participants to rate all aspects of an activity or product.

Reaction surveys or evaluations are an important tool to measure participants' satisfaction. They are relatively easy to administer, tabulate, and summarize in a results report.

* Kirkpatrick = Reaction; Phillips = Reaction, Satisfaction, Planned Action

Example Questions for "Reaction" level Evaluation:

Participating in the Coastal Water Toxin Reduction (CWTR) project was:

> Poor use of time 1…...2…...3…...4 Good use of time

Level of commitment needed in relation to the support provided was:

> Not enough 1…...2…...3 (just right) …...4…...5 Too much

Level 2. Learning

Knowledge evaluation measures whether participating in the program or project increases the audience's knowledge and awareness of the issues addressed and influences attitudes.

A number of different tools can be designed to measure what the audience has learned. Tests (given before and after), simulations, demonstrations, or other observable or measurable methods allow evaluators to determine if the knowledge or skills identified in the objectives were learned. It is important to remember that regardless of the method used, the test must relate directly to the objectives.

Learning evaluations are more difficult to design and administer than reaction evaluations. One reason for this is that learning evaluations must be customized for every instructional activity or project and must reflect the conditions of the specific job or real-world application of the learning. It is also important to remember that learning evaluations measure the level of knowledge or skills of participants at the time the test is administered. These evaluations do not indicate long-term knowledge or skill retention, nor are they an indication of how these will be applied to the real-world situation.

Example Questions for "Learning" level Evaluation

Who would you contact for advisory assistance about new process technologies?

    1.   **2.**

Suggest two ways in which your mill can reduce toxic effluents:

    1.   **2.**

Level 3. Behavior or Application*

Application evaluation measures whether the participant has been able to use the new knowledge and skills learned.

Level 3 is significantly more complex than the first two levels in that it requires contacting participants after they have had time to apply the new knowledge and skills. As with other evaluation levels, many different tools can be used to collect data. Each tool has different strengths and limitations. Tools include surveys, questionnaires, interviews, focus groups, observations, and reviews of written documents. Regardless of the tool, the questions should present specific skills and knowledge areas and ask participants if and how they have applied them since learning them. Questions would focus on relevance of the program or project, whether they have gone back and used materials provided by the program or project, how new knowledge has been applied to their jobs, and whether new skills have been used.

Measuring the application of the new knowledge and skills learned is becoming more accepted as a level that should be evaluated. It is important to know not only whether participants understood the material during the program or project, but also the extent to which they were able to go back to their "regular" jobs and apply it. This level of evaluation provides proof of whether transfer of learning has occurred. It is much more powerful to justify a program or project by demonstrating that participants used the information rather than reporting the number that participated or "liked" the program or project. Many decision makers are now demanding increased accountability from resources spent educating the target audience.

* Kirkpatrick = Behavior; Phillips = Application

Example Question for "Behavior" level Evaluation

Please check the box next to the steps you have taken in the past 2 years toward facilitating conversion. For those checked, please provide a brief description of what was done:

☐ Application for incentive

☐ Equipment/technology modification

☐ Process or procedure modification

☐ Reformulation or redesign of products

☐ Substitution of raw materials

Level 4. Results or Business Impact*

Results evaluation measures whether the behavioral changes have an overall impact on the environment or audience's lives.

There is a constant pressure on agencies to demonstrate the efficiency and effectiveness of all of their programs and projects. To actually conclude that the program or project has had its desired effect, the participants will have to successfully apply the new skills or knowledge. The term "successfully" is defined as the new skills and knowledge leading to the desired result or impact on an audience or the environment. This level of long-term information is becoming increasingly important when priorities are being set or when decisions to continue or remove the program or project are being made.

Level 4, or results evaluation, is typically feasible for only large-scale programs or projects that have been designed to have specific results for a specific audience. For example, if you were trying to measure the results of facilitation training for a group of participants, you would need to go to the people who had been facilitated by the participants. This requires that the measurements are at least one step removed from the participants of your program or project. Because it can be quite difficult to isolate the effect of your program or project, this level of evaluation can be complex.

* Kirkpatrick = Results; Phillips = Business Impact

Example Question for "Impact" level Evaluation

Has installation of new process technologies reduced the amounts of toxic effluents discharged by pulp and paper mills in Papyrus Bay?

Level 5. Return on Investment (ROI), or Cost-Benefit Analysis

Cost-Analysis Approaches in Evaluation

Cost-benefit analysis (CB)

CB is the evaluation of a program or project or product according to its costs and benefits when each is measured in monetary terms. A program or project or product must show benefits in excess of costs. In selecting from among several alternatives, one would choose that particular one that had the highest benefit-cost ratio (or, conversely, the lowest ratio of costs to benefits). For example, let's say you produce a compact disc (CD) on nonpoint source pollution. You track the total costs of production, marketing, and distribution and the monetary value of the outcomes. From those data you develop a benefit-cost ratio and assess the value of that product based on the ratio (Note: The major disadvantage of CB is that it is very difficult to assign values to benefits).

An alternate approach is

Cost-effectiveness analysis (CE)

CE is the evaluation of alternative programs or projects or products according to both their costs and their effects with regard to producing some outcome. The most preferable alternative would be the one that shows the lowest cost for the desired changes in outcome. For example, let's say you produce two products on nonpoint source pollution: a website and a brochure with CD. You track the total costs and outcomes of both and then compare to determine which product provides the maximum effectiveness per level of cost or, conversely, the least cost per level of effectiveness.

Source:
Levin, H.M., and McEwan, P.J. (2001). *Cost-effectiveness analysis: Methods and applications*. Thousand Oaks, CA: Sage Publications.

Figure 12 illustrates examples of some key evaluation questions, indicating where they link to each phase of the CWTR logic model.
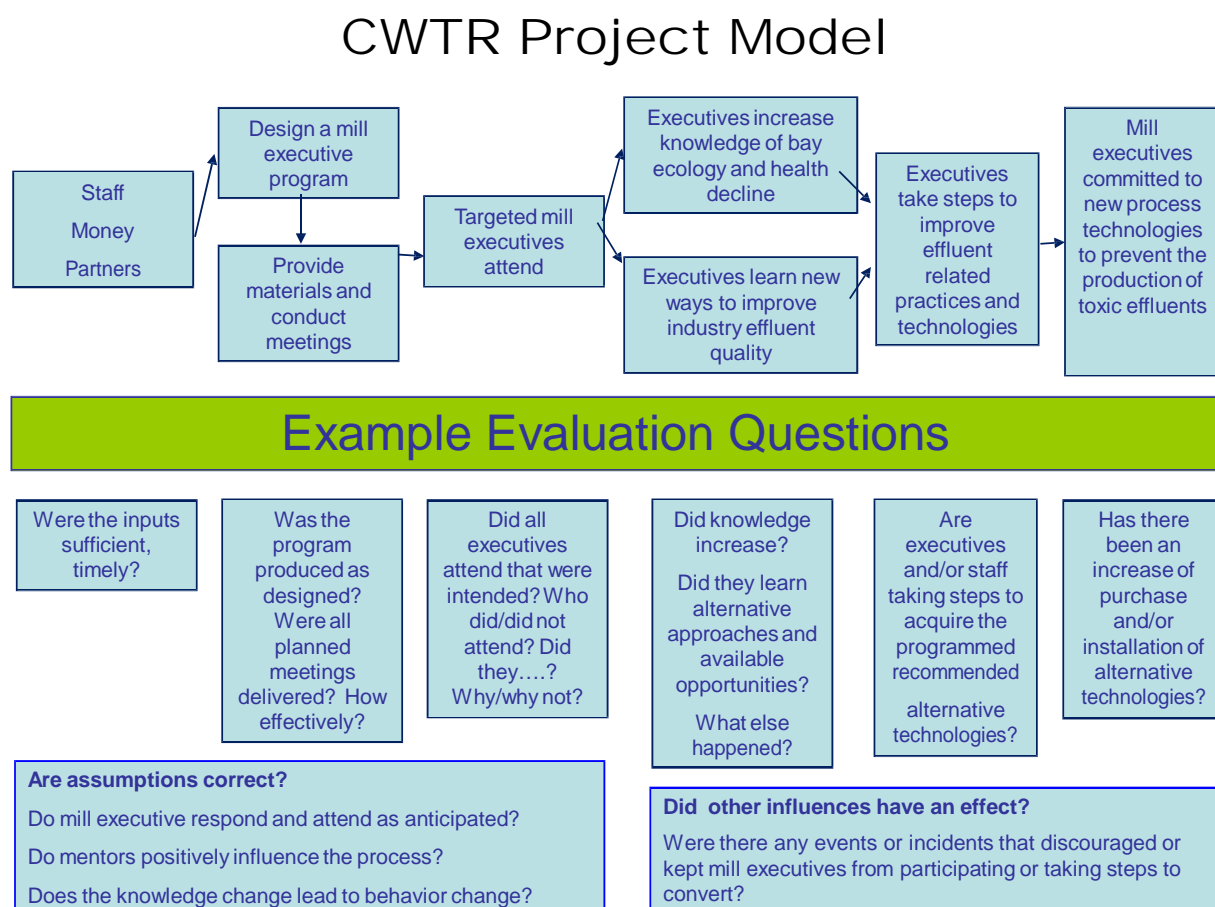
CWTR Project Model

Example Evaluation Questions

Staff **Money** **Partners**	

Design a mill executive program

Provide materials and conduct meetings

Targeted mill executives attend

Executives increase knowledge of bay ecology and health decline

Executives learn new ways to improve industry effluent quality

Executives take steps to improve effluent related practices and technologies

Mill executives committed to new process technologies to prevent the production of toxic effluents

Were the inputs sufficient, timely?

Was the program produced as designed? Were all planned meetings delivered? How effectively?

Did all executives attend that were intended? Who did/did not attend? Did they….? Why/why not?

Did knowledge increase?

Did they learn alternative approaches and available opportunities?

What else happened?

Are executives and/or staff taking steps to acquire the programmed recommended alternative technologies?

Has there been an increase of purchase and/or installation of alternative technologies?

Are assumptions correct?

Do mill executive respond and attend as anticipated?

Do mentors positively influence the process?

Does the knowledge change lead to behavior change?

Did other influences have an effect?

Were there any events or incidents that discouraged or kept mill executives from participating or taking steps to convert?

Figure12

Adapted from Taylor-Powell, Jones, and Henert, 2002, Enhancing Program Performance with Logic Models on-line course, University of Wisconsin-Extension.

Collecting Information

Once the evaluator has determined what is going to be measured and where to obtain such information, it is time to consider how data will be collected.

Data collection is the gathering of information to address those critical evaluation questions that were identified in the initial stages of the evaluative process. A number of data collection techniques are available to gather information, as are a wide variety of currently existing information resources. The most important issue related to data collection is determining the most appropriate information or evidence to answer your questions.

To plan for successful data collection, you must . . .

- Think about the questions to be answered and the information sources available.

- Begin to think about how the information could be organized, analyzed, interpreted, and subsequently reported to various audience types.

- Ask yourself what kind of data you might collect. Examples include gauging population attributes (personal, demographic information), topical knowledge, attitudes, beliefs, and behaviors.

- Consider ways to best collect reliable and valid information. Does it consistently measure the material over time? Is it just as meaningful in different geographic regions?

- Keep your target population in mind. Sample size will be determined by population dynamics.

- Consider sampling strategy, data collection methods, and constructing appropriate questions for various data collection methods. This refers to instrument design and how questions are written, ordered, and considered for specific question types (multiple choice, short answers, open-ended, yes/no, etc.)

Logistical Considerations – Pre-Data Collection

Before initiating any systematic, formalized data collection, it is wise to develop a schedule of required tasks that must occur before and during data collection. The strategy you develop should help make the data collecting process as time- and cost-effective as possible, while also ensuring high-quality data. The following text highlights a few such logistical, considerations.

Paperwork Reduction Act of 1995

A major pre-data collection consideration is the Paperwork Reduction Act of 1995 (PRA). This legislation requires that the Office of Management and Budget (OMB) grant approval for public information collection (e.g., surveys) by a federal agency before being conducted. According to the act, "information collection" is defined as a collection of identical questions presented to 10 or more members of the public. Approval must be granted for all forms of federal information collection, both mandatory (income tax reporting) and voluntary. Additionally, if an organization is collecting information on behalf of, or being funded by, a federal agency, approval must be granted.

The purpose of the PRA is to reduce the number of hours (time and effort) required of public citizens to provide information to the federal government. The OMB also takes steps in the clearance process to ensure that information collection methods are statistically and methodologically sound, resulting in high quality, usable data. Therefore, specific data testing and analysis methods must be considered in unison.

For additional information regarding the PRA and compliance details, please refer to the following websites:
- NOAA – *http://www.cio.noaa.gov/Policy_Programs/pra.html*
- U.S. Department of Health and Human Services – *www.hhs.gov/ocio/policy/collection/infocollectfaq.html*
- *U.S. De*partment of Agriculture – *www.ocio.usda.gov/infoc/faq_infoc.html*

Data Collection Strategy

It is also important to learn as much about your target population as possible before initiating any formalized data collection. For example, perhaps your organization is interested in problems that commercial lobster fishermen encounter with marine debris. First, a determination would need to be made as to when the lobster season is and who the lobster fishermen are in the state or region under observation. Second, considering the type of data collection method you are using (this will be covered later in the manual), a determination will need to be made on the best way to access the population of interest and to ensure the greatest likelihood of participation. In the example of the lobster fishermen, it may be determined that on-site/face-to-face interviews are the best means of collecting needed information. Next, the duration of an average interview and the frequency (number of times or days) of data collection needed to acquire the desired level of data must be determined. Finally, the investigator must consider the circumstances and behaviors of the target population. For example, lobster fishermen may be highly noncompliant in participating in interviews at the docks early in the morning when they're getting ready to head out to sea. Perhaps the end of the day after the vessels return and unloaded is the best time to approach the fishermen for optimal success and compliance. Knowing the audience's behaviors, daily schedule, collective biases, and so on will lead to greater success by saving time and money and acquiring a more complete and detailed data set.

Quantitative and Qualitative Collection Methods

One element common to evaluations is that they all require a systematic, well-planned information collection strategy, whether the information is collected from currently existing (secondary) sources or if you plan to collect new, primary information. These data are broadly defined in two major categories—quantitative and qualitative. Quantitative, or numeric data, include measures such as counts of technical staff members, number of total years experience in the coastal management field, or the extent of technical support provided to GIS technicians. Qualitative, or descriptive data, provides narrative information, such as descriptions of what information participants would like to receive from a formal training or participant motivations for attending. The most successful evaluations combine elements of quantitative and qualitative data collection. Determining which to use should be made with an understanding that there are multiple ways to ask the same question— and receive very different answers.

Quantitative Data Considerations

Statistical analysis is something that makes a number of people cringe. However, there are many very useful, simple statistical measures called "descriptive statistics" that are easy for anyone to understand. They are called descriptive statistics, quite simply, because they *describe* your raw evaluation data. They generally highlight basic features of the information. Additionally, a number of these descriptive measures are very simple to calculate, requiring nothing more than a basic calculator.

Descriptive Statistics

Numerical counts or frequencies represent the simplest quantitative approach. They tell us how many times something happens, how many responses fit into a particular category. In many cases, simple counts are all that is needed to answer a question. They also serve as a building block for other measures, such as percentages.

For example,
- 72 respondents reported having at least 20 years of professional experience in the pulp and paper industry.
- There were 12 documented violations at the South Bay Paper Mill associated with the new CWTR standards**.**

Percentages express information as a proportion of a whole. They are also easy to interpret, making comparisons meaningful. Frequencies are also useful when you want to display a distribution of data values.

For example,
- 55% of respondents have over 20 years of professional experience in the pulp and paper

industry, while 25 percent possess 5 or less years of experience**.**

Measures of central tendency explain what is typical or common about responses. There are three common measures of central tendency:

- **Mean** – This is simply the average. The value is calculated by adding all numeric responses and dividing by the total number of responses.
- **Median** – The value that appears in the middle when a series of numbers are ordered from lowest to highest. If there are an even number of values, then the median is the average of the two middle numbers.
- **Mode** – This is the most frequent answer or value and refers to the most common response or the most frequent situation. It is most useful when a large number of values are available. If all numbers appear once or two numbers appear equally "highest" **then there is no mode**.

For example,
- Mean $1+4+5+3+4+2 = 19 \div 6 = 3.16$
- Median   3,3,3,3,3,4,4,4,<u>4</u>,<u>5</u>,5,6,6,6,6,6,7,7 = 4.5
- Mode   <u>3</u>, 4, 6, <u>3</u>, 7, <u>3</u>, <u>3</u>, <u>3</u>, <u>3</u>, 8, 9, 11, <u>3</u> = 3

Measures of variability call attention to the "spread or variation" in responses. There are three measures of variability:

- **Range** – A comparison of the lowest and highest expressed values. This is the simplest measure of variability. The range can be presented as a comparison ("responses ranged from 4 to 10"), or as a numeric expression obtained by subtracting the lowest value from the highest.

For example,
- Range   6, <u>4</u>, 7, 6, 8, 5, <u>10</u>, 7, 6 = 4 to 10 (as a comparison) <u>or</u> 6 (as a single numeric expression)

- **Standard Deviation** – Measures the average distance that scores lie from the mean. The higher the standard deviation, the greater the responses varied from the mean. Likewise, the lower the standard deviation, the closer the scores are to the mean. In the instance where all scores are identical, there is a value of zero, or no deviation present.

- **Variance** – The square of the standard deviation

Additionally, there are more complex measures known as inferential statistics. Inferential statistics allow a researcher to arrive at a certain conclusion that is based on probability, and they help to determine correlations among different measures. These conclusions extend beyond the immediate data alone. They are used to highlight relationships among and between variables. For example, does age influence job status, or does formalized training enhance GIS skills and abilities?

What to do with that quantitative survey data?

1. CONTEXT: Federal and some state funds have been granted to support the CWTR project. The grants require an evaluation at the end of the 3rd year of project implementation. Continuous monitoring of performance measures (and anecdotal information from staff) indicates to the CWTR project team that they are positioned to evaluate a midterm project outcome.

2. WHO: The CWTR project team has decided to conduct a survey of pulp and paper mill executives (i.e. mill owners and managers). A total of 35 executives were targeted for the survey.

3. FOCUS: The survey focuses on mill executives' commitment to new process technologies to prevent production of toxic effluents (mid-term outcome and evaluation question). The survey gathers data about the following evaluation question:
   How committed are mill executives to adopting new process technologies to prevent production of toxic effluents?

4. SAMPLING SCHEME – Audience characterization identified that older mill executives tended to be less technologically savvy than their younger counterparts. Also, all were very busy and placed little value on tasks not related to pulp and paper production. With this in mind, CWTR created a survey that was short, focused, and close-ended with a goal of getting a 100% return rate. CWTR created both an online and print version of the survey consisting of multiple choice questions. Questions were carefully drafted (using Introduction to Survey Design and Delivery, NOAA Coastal Services Center, 2007) and piloted with 2 local mill executives (one owner and one manager from different mills). Adjustments to the language of the cover letter, questions, and response options were made based on feedback.

5. INSTRUMENT – web page and hard copy survey with six multiple choice questions. All General Managers were sent a survey with four additional, mill-level questions, totaling 10 questions.

6. DATA MANAGEMENT - Upon completion of the survey, the user clicked a button on the page which sent their responses into a small database. This ensured accurate compiling and organization of the data. Print surveys were mailed back to the CWTR project office (postage paid) by respondents, and entered manually by staff into the database. The web page and the database were archived on a CD.

7. RESPONSE RATE: The survey was distributed and reminders were sent. The rate of response was 88%, with 31 of 35 executives responding.

Questions from the CWTR Project Survey Instrument

1. **Demographics: Please identify your role in the mill:**
   ❑ Owner
   ❑ General Manager
   ❑ Assistant Manager
   ❑ Departmental Manager

2. **Think of the proposed solutions for reducing toxic effluents generated through your participation in the CWTR project. Please rate how satisfied you are with those solutions overall.**
   a. Very satisfied – I think the proposed solutions will be cost-effective at reducing toxic effluents
   b. Somewhat satisfied – I think that with some modification, the proposed solutions will be cost-effective at reducing toxic effluents
   c. Somewhat dissatisfied – I think that the solutions identified will be cost-prohibitive at reducing toxic effluents
   d. Very dissatisfied – I think that we need to go back to the drawing board

3. **Please rate your level of satisfaction with the productivity of the CWTR mentor program.**
   a. Very satisfied
   b. Somewhat satisfied
   c. Somewhat dissatisfied
   d. Very dissatisfied

4. **Think about when you first learned about the intent of the CWTR project. Which statement best represents how concerned were you about exposing you current practices and processes in order to receive assistance?**
   a. I was afraid that our mill would be shut down
   b. I was concerned that our mill would be fined
   c. I was comfortable sharing our current practices and processes with the CWTR project staff

5. **On a scale of 1-5 (with 1 being of very low value and 5 very high value), please circle the value you place on the mentor program.**
   Very low   1 --------------2 -------------3 --------------4 --------------5 Very high

6. **Which choice best reflects your opinion of the advisory assistance provided by CWTR staff about reducing toxic effluents available from CWTR?**
   a. Highly reliable
   b. Somewhat reliable
   c. Somewhat unreliable
   d. Highly unreliable

= The remaining four questions were included only on surveys distributed to General Managers=

7. **Please tell us where you are in the preparation of your mill's action plan to reduce toxic effluents (in compliance with federal regulations).**
   a. Action Plan completed by June 15th 2009
   b. Action Plan completed after June 15th 2009
   c. Action Plan in development
   d. Action plan development stalled
   e. Not developing an Action Plan

8. **What level of effort has been necessary for your mill to participate in the CWTR project?**

   a. Approximately how many staff hours to date has your participation in the CWTR project required? _____

   b. Overall, how much effort have you felt necessary to participate in the CWTR project?
      i. Significant effort – Burdensome to participate
      ii. Moderate effort – Reasonable demands to participate
      iii. Little effort – Easy to participate

9. **How complete is your mill's application for incentives to facilitate needed facility, equipment and/or supplier conversions?**
   a. Completed application and submitted for consideration
   b. Completed application
   c. Incomplete application
   d. Not applying

10. **If you responded (a) to #9 above, has your mill received funding for incentives?**
    a. Yes
    b. Have not been notified yet
    c. Funding denied

CWTR Project Survey Results and Data Analysis

1. **Demographics: Please identify your role in the mill:**
   ❑ Owner (6 responses)
   ❑ General Manager (5 responses)
   ❑ Assistant Manager (7 responses)
   ❑Departmental Manager (13 responses)

   Examples of analysis:
   - **Numerical counts or frequencies**—25 respondents identified themselves as managers.
   - **Percentages**—81% of respondents identified themselves as managers.
   - **Measures of central tendency**—the most common role among respondents (mode) was Departmental Manager

2. **Think of the proposed solutions for reducing toxic effluents generated through your participation in the CWTR project. Please rate how satisfied you are with those solutions overall.**
   a. Very satisfied – I think the proposed solutions will be cost-effective at reducing toxic effluents (23 responses)
   b. Somewhat satisfied – I think that with some modification, the proposed solutions will be cost-effective at reducing toxic effluents (6 responses)
   c. Somewhat dissatisfied – I think that the solutions identified will be cost-prohibitive at reducing toxic effluents (1 response)
   d. Very dissatisfied – I think that we need to go back to the drawing board (1 response)

   Examples of analysis:
   - **Numerical counts or frequencies**—29 respondents were satisfied with the solutions for reducing toxic effluents generated through their participation in the CWTR project. 2 respondents were dissatisfied.
   - **Percentages**—94% of respondents were satisfied with the solutions for reducing toxic effluents generated through their participation in the CWTR project.
   - **Measures of central tendency**—respondents were most commonly (mode) "very satisfied" with the solutions for reducing toxic effluents generated through their participation in the CWTR project.

3. **Please rate your level of satisfaction with the productivity of the CWTR mentor program.**
   a. Very satisfied (3 responses)
   b. Somewhat satisfied (3 responses)
   c. Somewhat dissatisfied (20 responses)
   d. Very dissatisfied (5 responses)

   Examples of analysis:

- **Numerical counts or frequencies**—25 respondents were dissatisfied with the productivity of the CWTR mentor program.
- **Percentages**—81% of respondents were dissatisfied with the productivity of the CWTR mentor program; only 3 of 31 respondents were "very satisfied" with the productivity of the CWTR mentor program.
- **Measures of central tendency**—respondents were most commonly (mode) "somewhat dissatisfied" with productivity of the CWTR mentor program.

4. **Think about when you first learned about the intent of the CWTR project. Which statement best represents how concerned were you about exposing you current practices and processes in order to receive assistance?**
   a. I was afraid that our mill would be shut down (4 responses)
   b. I was concerned that our mill would be fined (20 responses)
   c. I was comfortable sharing our current practices and processes with the CWTR project staff (7 responses)

   Examples of analysis:
   - **Numerical counts or frequencies**—24 respondents expressed concern about exposing their practices and processes in order to receive assistance; seven respondents were comfortable sharing practices and processes with the CWTR staff.
   - **Percentages**—77% of respondents expressed concern about exposing their practices and processes in order to receive assistance; 23% of respondents were comfortable sharing practices and processes with the CWTR staff.
   - **Measures of central tendency**—respondents most commonly (mode) indicated that they were "somewhat concerned" about exposing their practices and processes in order to receive assistance

5. **On a scale of 1-5 (with 1 being of very low value and 5 very high value), please circle the value you place on the mentor program.**
   VL   1 (3 responses) ----2 (12 responses) ----3 (10 responses) ----4 (4 responses) ----5 (2 responses) VH

   Examples of analysis:
   - **Numerical counts or frequencies**—25 respondents rated the value of the mentor program a three or below on a scale of one to five, with five being high value.
   - **Percentages**—81% of respondents rated the value of the mentor program a three or below on a scale of one to five, with five being high value.
   - **Measures of central tendency**—respondents most commonly rated the value of the mentor program a two on a scale of one to five, with five being high value.

6. **Which choice best reflects your opinion of the advisory assistance provided by CWTR staff about reducing toxic effluents?**

   a. Highly reliable (26 responses)
   b. Somewhat reliable (4 responses)
   c. Somewhat unreliable (1 response)
   d. Highly unreliable (0 responses)

   Examples of analysis:
- **Numerical counts or frequencies**—All but one respondent felt the advisory assistance on reducing toxic effluents available from CWTR to be reliable.
- **Percentages**—30 of 31 respondents felt the advisory assistance on reducing toxic effluents available from CWTR was reliable; 84% of respondents felt the advisory assistance on reducing toxic effluents available from CWTR was highly reliable.
- **Measures of central tendency**—respondents most commonly felt the advisory assistance on reducing toxic effluents available from CWTR was highly reliable.

= The remaining four questions were included only on surveys distributed to General Managers=

7. **Please tell us where you are in the preparation of your mill's action plan to reduce toxic effluents (in compliance with federal regulations).**
   a. Action Plan completed by June 15th 2009 (1 response)
   b. Action Plan completed after June 15th 2009 (2 responses)
   c. Action Plan in development (1 response)
   d. Action plan development stalled (1 response)
   e. Not developing an Action Plan (0 responses)

   Examples of analysis:
- **Numerical counts or frequencies**—three mills targeted by the CWTR Project have completed toxic effluent reduction action plans.
- **Percentages**—three out of five mills targeted by the CWTR Project have completed a toxic effluent reduction action plan.
- **Measures of central tendency**— mills targeted by the CWTR Project most commonly (mode) completed a toxic effluent reduction action plan after June 15, 2009.

8. **What level of effort has been necessary for your mill to participate in the CWTR project?**

   a. Approximately how many staff hours to date has your participation in the CWTR project required?_____(responses = 40, 56, 80, 90, 110)

   b. Overall, how much effort have you have felt necessary to participate in the CWTR project?
      i. Significant effort – Burdensome to participate (1 responses)
      ii. Moderate effort – Reasonable demands to participate (1 responses)

      iii.   Little effort – Easy to participate (3 responses)

Examples of analysis (a):
- **Numerical counts or frequencies**—one respondent reported requiring only 40 hours for participation in the CWTR project.
- **Percentages**—three of five respondents reported requiring 80 hours or less to participate in the CWTR project.
- **Measures of central tendency**—respondents reported requiring an average (mean) of 75.2 hours for participation in the CWTR project; the median response for time required to participate in the CWTR project was 80 hours.
- **Measures of variability**—the number of staff hours required for participation in the CWTR project ranged by 70 hours.

Examples of analysis (b):
- **Numerical counts or frequencies**—only one respondent reported that participation in the project required significant effort.
- **Percentages**—only one of five respondents reported that participation in the project required significant effort; three of five respondents reported that participation in the project required little effort.
- **Measures of central tendency**—respondents most commonly indicated that participation in the project required little effort.

9. **How complete is your mill's application for incentives to facilitate needed facility, equipment and/or supplier conversions?**
   a. Completed application and submitted for consideration (3 responses)
   b. Completed application (1 response)
   c. Incomplete application (1 response)
   d. Not applying

Examples of analysis:
- **Numerical counts or frequencies**—three mills targeted by the CWTR Project have submitted an application for incentives to facilitate needed facility, equipment and/or supplier conversions.
- **Percentages**—four of five mills targeted by the CWTR Project have completed an application for incentives to facilitate needed facility, equipment and/or supplier conversions.
- **Measures of central tendency**—the most common (mode) application status among mills targeted by the CWTR Project was "completed application and submitted for consideration."

10. **If you responded (a) to #9 above, has your mill received funding for incentives?**
   a. Yes (1 response)
   b. Have not been notified yet (1 response)
   c. Funding denied (1 response)

Examples of analysis:

- **Numerical counts or frequencies**—one mill has received incentives, one mill has not yet been notified about their application for incentives, and one mill has been denied funding for incentives.
- **Percentages**— one of three mills has received funding, one has not been notified, and one has been denied.
- **Measures of central tendency**—N/A because there is no mode.

Qualitative Data Considerations

Qualitative analysis refers to the collection of narrative data to address a research question. These data are a descriptive account of words and observations and do not focus on numbers. Through a collection of narrative statements, trends and patterns emerge. A great wealth of information is available through qualitative methods though the analysis can be quite time-consuming. The analysis is based on content analysis (e.g., repetition of key words). Qualitative data can offer great insight into causal processes, explaining why things are the way they are and how they came to be that way. This is due to the close relationship between people and their associated problems and challenges. Alternatively, qualitative data can also be expensive and time-consuming to collect, and data are often misinterpreted due to a non-uniform reporting mechanism.

Analyzing Qualitative Data
(adapted from Taylor-Powell and Renner, 2003, University of Wisconsin-Extension)

Qualitative data can take many forms, such as survey responses, interview transcripts, journal entries, observational field notes, media reports, and case studies. The following is a systematic approach to the analysis and interpretation of qualitative data. This process is often referred to as content analysis.

1. **Get to know your data** – In this preliminary step, the objective is for the investigator to become as familiar as possible with data holdings. This may take a considerable amount of time, depending on the volume of text you have obtained. If you have recorded interviews or field observations, it is useful to transcribe them. Additionally, listen to them several times and take note of the tone in which information is delivered by the respondent. Also be sure to record your impressions of all written and audio communication as you work through the information. This information is often useful when reporting and interpreting the data at a later time. Be sure to also consider the quality of your data. A lot of data does not guarantee good data. A good bit of information, even in high-quality qualitative studies, may provide little meaning or value. Additionally, it may have been collected in a biased fashion. It is important to explain all possible limitations up front to provide a realistic account of what you data may explain (or not explain). By concealing such information, you risk not only the strength of your evaluation report, but also your organization's reputation for conducting good quality, evaluative research.

2. **Focus on the analysis** – Revisit your evaluation's purpose and goals. Write down key information needs. How do you want to focus your analysis—by question or topic, or by case or group?

3. **Categorize information** – The purpose is to give meaning to words and phrases. Categorizing is not the same as coding. Coding involves assigning numeric codes to label variables. Identify trends, general themes, and patterns, including ideas, concepts, behaviors, terminology, or phrases used. Organize data into categories that summarize

and bring meaning to the text. THIS IS THE CRUX OF QUALITATIVE ANALYSIS!! It is sometimes helpful to assign abbreviated codes of a few letters or words to help label and organize categories (see Figure 13). As you do this you may also identify subcategories. This can be labor-intensive!

Figure 13, below, is actual data from a recreation satisfaction survey of visitors to recreational beach areas in North Carolina. It is a sample of how qualitative data may be categorized and arranged to lend meaning to an assortment of qualitative statements. The categories, penciled in the margins of the diagram, are the categories that were most useful, and most in alignment with the study goals of the researcher. The categories should take into account, not only the actual content, but also the evaluation goals and objectives.
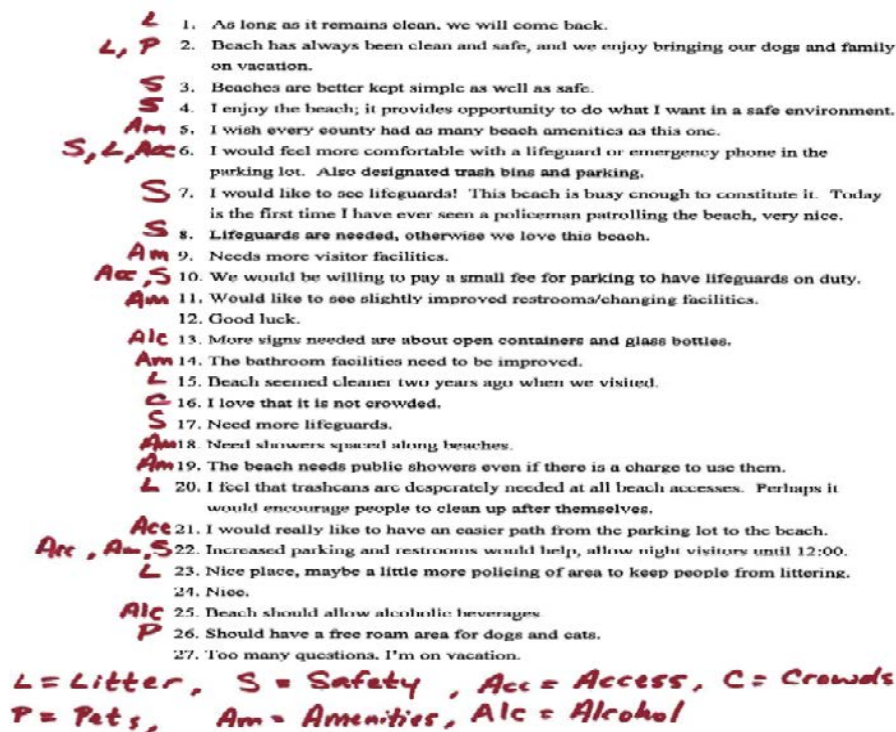
Figure 13

4. **Identify Patterns** – As you continue your analysis, connections within the text will begin to appear. It is important to take note of the various themes and pay close attention to any subtleties that may be important to the analysis. The following are a couple of pointers:

- *Within a single category* – You may like to summarize the information pertaining to one theme. To do this, you need to assemble all the data pertaining to the particular theme

(category). What are the key ideas being expressed? What are the similarities in the way people responded, including the subtle variations? It is helpful to write a summary for each category that describes these points

- *Larger/combined categories* – You may wish to combine larger, super categories. You can work up from more specific categories to larger ideas and concepts. Then you can see how the parts relate to the whole.

- *Relative importance* – To determine importance, you may want to count the number of times a theme comes up, or the number of times a unique respondent refers to certain themes. These counts can provide a rough estimate of relative importance. They are not statistically significant, but can reveal general patterns in the data.

- *Relationships* – You may also discover that two or more themes occur together consistently in the data: for example, safety and rangers. From this you may draw the conclusion that safe beaches are a primarily perceived as a result of frequent ranger patrols. Relationships can **HELP** explain why something occurs. Be careful not to tie strict cause-and-effect relationships because this is rarely the case. Seldom is human behavior so simple! Consider developing a table or matrix to illustrate relationships across two or more categories.

  Additionally, be sure to pay attention to statements that do not fit into specific themes. This information can often be valuable.

5. **Interpretation** – In this step you should clearly articulate what you have learned. This will offer a richness and meaning to your analysis. Some general questions to guide your interpretation include the following: what does all this information mean? What are the most important aspects? What new information has been learned? What are the main points with which the reader should be made familiar? Above all, what will your *evaluation users* be most interested in knowing? It is sometimes helpful to include descriptive, case examples to illustrate key points and display the data in a practical context. Finally, consider the use of models with arrows and boxes to display how multiple pieces fit together and where gaps exist and greater engagement may be required.

Very importantly, avoid the use of generalization. Qualitative analysis in and of itself is not intended to be generalized across populations. Rather it is meant to provide a keen understanding of respondent perspectives within a particular population of interest. To avoid generalization, select any direct quotes carefully. Direct quotes are often effective in providing context and meaning, but they can be easily misused to exaggerate success or to oversell a particular point, which leads to study bias. Be up front about the purpose for using a specific quote and state it within your report. Provide enough text to allow the reader to understand the context in which it was conveyed. Confidentiality and anonymity are of critical importance. It is very important to consider the consequences of someone figuring out who said what! Be sure to get people's permission to use their quotes. It is also

helpful to check with others on the evaluation team about their opinions of using selected quotes.

Qualitative Data Analysis Checklist

1. Get to know your data

❑ Read and familiarize yourself with the information

❑ Write down your impressions

❑ Describe the integrity and quality of the information

❑ Explain the limitations

2. Focus on the analysis

❑ Write down your key information needs that are based on your evaluation goals

❑ Decide how you need to focus your analysis (by question? by group? etc.)

3. Categorize information

❑ Identify and write down any trends or themes that present themselves

❑ Organize your data into these categories

4. Identify connections

❑ Consider combining similar categories to strengthen data groupings

❑ Consider the relative importance level of each category, based on goals

❑ Identify any connections or relationships between categories

5. Interpret your data

❑ Describe, in depth, what you have learned

❑ Draw attention to the main points

❑ Consider what your evaluators will be most interested in knowing

What barriers have the pulp and paper mill encountered in implementing pollution reduction activities?

1. Letting others know we want to change will draw suspicion that we are in violation

2. This is ridiculous.

3. I'd like to strangle the guys who make the rules.

4. This will likely create a need for new equipment, we don't have the capital.

5. It seems like as soon as I turn my back, things go downhill.

6. We don't have the money to do anything different.

7. There seems to be no straight answer as to who is doing what.

8. I have trouble keeping staff members informed on what we're currently doing. I can't imagine implementing new practices.

9. We don't have the people to move beyond compliance.

10. If we change, our costs will be higher.

11. Doing things differently always costs more.

12. We don't have time to re-train workers.

13. What will we do with our existing inventory?

14. Why should we change? Others won't, and they won't be penalized.

15. What's in it for us?

16. What if we do all this and then all the rules change again?

17. The feds don't really want to help us; ultimately, they just want to shut us down.

18. Our client contracts require that we use this stuff.

19. Who's gonna get the EPA to change their specs?

20. With increasing costs, this is putting us in a real dilemma.

21. I have trouble making the case to my staff that this is important.

22. Lots.

23. I have no idea how to even respond to this idea. Where do we even start?

24. We don't want anybody telling us what we do now can't continue.

25. Somebody needs to help train the workforce if they expect us to comply. I'd be interested to know if anyone has any ideas on how we can do this.

Data Collection Methods

The following pages describe eight common data collection methods and the benefits and limitations of each one.

1. Interview
2. Focus Group
3. Questionnaire
4. Observation
5. Existing Data
6. Test
7. Concept Map
8. Rubric

Some Data-Gathering Methods for Evaluation: Benefits and Limitations

Interview, Focus Group, Questionnaire, Observation, Existing Data, Test, Concept Map, Rubric

Evaluation Methods

The following table summarizes the purpose, advantages, and challenges of some different data collection methods that you may use when conducting an evaluation.

Method	Overall Purpose	Advantages	Challenges
Interview	To fully understand someone's impressions or experiences, or learn more about their answers to questionnaires	• can get full range and depth of information • develops relationship with client • can be flexible with client	• can take much time • can be hard to analyze and compare • can be costly • interviewer can bias client's responses
Focus Group	To explore a topic in depth through group discussion, e.g., about reactions to an experience or suggestion, understanding common complaints, etc.; useful in evaluation and marketing	• can quickly and reliably get common impressions • can be efficient way to get much range and depth of information in short time • can convey key information about programs	• can be hard to analyze responses • need good facilitator for safety and closure • difficult to schedule 6–8 people together
Questionnaire, Survey, and Checklist	To quickly or easily get lots of information from people in a non-threatening way	• can complete anonymously • inexpensive to administer • easy to compare and analyze • can administer to many people • can get lots of data • many sample questionnaires already exist	• might not get careful feedback • wording can bias client's responses • impersonal • in surveys, may need sampling and statistical expertise • doesn't get full story
Observation	To gather accurate information about how a program actually operates, particularly about processes	• view operations of a program as they are actually occurring • can adapt to events as they occur	• can be difficult to interpret behaviors • observations can be difficult to categorize • can influence participants' behaviors • can be expensive

Method	Overall Purpose	Advantages	Challenges
Existing Data	To gather information on the audience or the issue. Identify what previous investigators have found about the state of the knowledge, skills, behaviors, or attitudes of the intended audience with relation to the issue	• can provide much information in relatively little time • has most likely been reviewed or seen by audience • makes use of already gathered information • helps to chart changes over time • provides evidence about the problem • minimum effort or interruption of audience	• can be out-of-date (e.g., technology needs) • data synthesis can be difficult • may not address specific questions of concern • not flexible means to get data; data restricted to what already exists • statistical data may not address perceptions of the problem, or may not address causes • reports may be incomplete
Test	To determine the audience's current state of knowledge or skill regarding the issue	• helps identify a problem or a deficiency in knowledge or skills • results are easily quantified • individual performances can be easily compared • easily seen as job-related • helps determine if the problem is a training issue	• limited availability of validated tests for specific situations • results can be influenced by attitudes • language or vocabulary can be an issue • people may be concerned about how results will be used • adults may resent taking tests
Concept Map	To gather information about someone's understanding of and attitudes toward a complex subject or topic	• offers a more comprehensive and complex view of someone's thinking than a test does • could be a better tool for visual learners or test-phobic people • can gather qualitative & quantitative data • useful for adults and children	• takes training to complete properly • takes training to administer • can be challenging & time-consuming to score • can be difficult to analyze and interpret
Rubric	To assess how well someone is able to perform a task or behavior	• focuses an observer's observations • makes a hard-to-quantify performance quantifiable • useful to assess what people do rather than just what they know • good for collecting time-series data	• development can be time-consuming because it requires the identification of all key elements of a performance • not flexible; could miss key elements if not listed on the rubric • high degree of subjectivity

(adapted from C. McNamara, 1998)

1.   Interview

Active interchanges between people either face-to-face or via technology.

Benefits

- Variety of perspectives can be elicited
- Can be very useful way to build rapport with audience or participants
- Can generate broad and deep data about system
- Interviewer can clarify questions and ask for clarification of responses
- Interviewer can receive additional information in the form of nonverbal clues
- Can adapt questions if difficulties arise
- Less structure allows for new (unplanned for) information to be gathered
- Can ask for more information than people would want to write in a survey
- Respondents use their own words

Limitations

- Bias due to data collector's interest
- Time-intensive
- Self-reporting of participants may bias data
- Discussion can wander from purpose of interview
- Unskilled interviewers can make clients feel self-conscious
- Unskilled interviewers may gather poor data
- Variations occur if there's more than one interviewer
- Open-ended responses can be difficult to organize and analyze
- Difficult to capture everything said unless taping the interview
- Small sample
- Replication difficult

Techniques and Tips

- Can be used to generate "buy-in" from participants
- Use to increase the breadth of understanding and refine the initial perspective on a situation
- Can be used for initial input in association with survey which would then validate information
- Rich discussions lead to proportionally larger amount of time analyzing data
- Planned, focused discussion will take more time to create and less time to analyze
- Skilled interviewers can help keep the discussion productive
- Plan for a comfortable private environment free of interruptions
- Do homework before the interview, come prepared
- Avoid counseling the interviewee
- If the interviewee asks for a comment to be "off record," accommodate that wish
- Never betray your client's trust
- Know how to use active listening

- Plan a consistent preamble, including who the interviewer is, who the interviewer is working for, what kind of questions will be asked, the amount of time that will be needed, and what will be done with the data

2.   Focus Group

An interactive exchange between an interviewer or facilitator and a group of people.

Benefits
- May be inexpensive
- Input can come from wide range of people and perspectives
- Participants may have positive public relations impacts
- Can clarify different points of view
- Can really investigate root of problem
- Can use brainstorming techniques

Limitations
- Difficult and time-consuming to analyze, synthesize, and quantify
- May represent special interests
- Participants may use as gripe session
- May heighten expectations beyond what can be realistically provided
- One participant may influence attitudes and opinions of others
- Need to transcribe and code information for analysis
- Cannot capture all information without taping session
- Not all people are comfortable being taped
- Small sample size

Techniques and Tips
- Avoid getting people who already know each other very well
- Try getting people who are willing to share their opinions
- Get all stakeholders in on issue
- Establish ground rules to keep responses confidential
- Plan on telephone calls to remind participants of meeting
- Meeting room needs to be comfortable and free from distractions
- Facilitation is key. Must direct conversation without being part of it
- Structure questions from general to specific
- Should be recorded (audio or video), then transcribed
- Asking participants to write ideas down beforehand reduces influence of other participants

Helpful information on focus groups can be found at
www.tc.umn.edu/~rkrueger/focus.html

3. Questionnaire, Survey, and Checklist

Data collection method through which individuals respond to printed or oral questions—may be completed by either respondents or data collector.

Benefits
- May be easiest to quantify, summarize, and report on the data
- Time-effective for use with geographically dispersed or large sample (respondents complete and return)
- Large sample size; data can be generalized to population
- Range from inexpensive to expensive (depending on design and administration)
- Can provide opportunity for expression without fear of embarrassment (anonymity)
- Can (should) be designed to be relatively bias-free
- Questions from other instruments can be used or modified
- Can get qualitative and quantitative data
- Respondents can complete at their convenience (for written instruments)
- Useful at all evaluation stages
- High level of return for interview-style surveys
- Does not depend on reading proficiency of audience (oral survey)
- Good for information that requires sequencing (they can't read ahead) (oral survey)
- Interviewers can clarify questions if conducted in person
- Can indicate strength to which something is felt through observation (if conducted in person)
- Easily adaptable to a wide variety of environments

Limitations
- May have limited provision for unanticipated responses
- Can't change once the survey is distributed
- Time and high level of skill needed to develop
- Pilot testing takes time
- Results depend on question quality
- Low return rates which can skew data
- Can be impersonal (written, self-response format)
- Questions may miss true issues
- Questions and answers can be interpreted differently
- People have been negatively conditioned to the value of surveys
- May heighten expectations
- Language or vocabulary may be an issue
- People tend to want to get the "right" answers

- People will use opportunity to vent or describe their issues
- The interviewer can influence the respondents
- People may hurry through answers without thinking about them

Techniques and Hints
- Questionnaires can be either open- or closed-ended
  - → Open-ended: easier to construct but more difficult to quantify and interpret; audience less likely to answer
  - → Closed-ended: more difficult to construct but easier to interpret
  - → Use closed-ended if there will be 25 or more questionnaires
- For mailed surveys, follow-up phone calls or reminders can increase return rate
- Setting the stage is very important to get participation or high return rates
- Let people know how and when data will be used
- Separate data from names
- Questions must be very easy to read or understand
- If questionnaire is to be mailed, ensure correct and complete mailing list
- Personal contact is best way to motivate people to complete questionnaire
- Consider computer-based questionnaires (if audience-appropriate), which can follow more complex question patterns than paper and pencil
- Develop or use question banks
- Always pilot the questionnaire
- In general, people can express themselves better orally than in writing
- Train volunteers to be nonjudgmental and follow sampling scheme

4.   Observation

Data collection based on watching a process or skill and systematically recording events—these observations may be made by people or using media.

Benefits
- Little interruption of work flow or group activity (if done properly)
- Works best with specific skill-based tasks
- Useful for goal-free evaluation
- Generates data about actual behavior, not reported behavior
- Can see program in action
- Good in-depth data
- Observer presence may improve program
- Avoids self-reporting problems
- Data collected in context
- An astute observer can recognize interaction problems not easily described by participants
- The observer can follow action at different points in the system
- Administrative costs can be kept to a minimum

Limitations
- Requires process and content knowledge by observer
- Observer can disrupt or alter the system
- Observer can be seen as a spy
- Hard to remain objective (data can be skewed by observer's biases)
- Data are not easily quantifiable
- Typically, small sample size
- Usually time-intensive
- Don't know how participants view their actions
- Replication difficult

Techniques and Tips
- Clearly identify the purpose of the observation and specific phenomena to be observed
- Describe actions with narrative statements, checklists, or matrix
- Must have content knowledge about system
- Plan record keeping. How will data be quantified? How will data be collected and recorded? If more than one data collector, how will data be made consistent?
- Plan physical setting for data collector to blend in to
- Plan how you will explain data collector's presence to workers (why? how long? what will be done with the data?)

5.   Existing Data

Existing information in the form of reports, work samples, historical data, planning and budget reports, organizational structure charts, evaluations, career development reports.

Benefits
- Can be less time-consuming
- Most likely have been reviewed or seen by clients
- Makes use of already gathered statistical data
- Easier to chart changes over time
- Provides excellent evidence of problem
- Minimum effort or interruption of workers

Limitations
- Can be out-of-date, e.g., technology needs
- Data synthesis can be difficult
- May not address specific questions
- Statistical data may not address people's perceptions of needs
- Causes of problems may not show up
- Reports may be incomplete (may lack metadata)
- Organizations can be hesitant to share if results reflect poorly on organization
- Reports may be adjusted or selectively edited

Techniques and Tips
- Census and economic data are typically already available
- Remember the purpose of a needs analysis is not to establish blame for why the need exists
- Check ethical or legal constraints in reviewing records
- Can include existing reports, job descriptions, performance appraisals, past needs assessments
- Use established networks to find data
- Review documents for relevant data
- If material is not immediately accessible, consider how much time will be wasted in searching for information that may not be available

6.   Test

An exam that assesses knowledge or skill level.

Benefits
- Helps identify a problem or a deficiency in knowledge or skills
- Results are easily quantified
- Individual performances can be easily compared
- Easily seen as job-related
- Helps determine if it is a training issue

Limitations
- Limited availability of validated tests for specific situations
- Validity issues – does it test knowledge and skills actually used on job?
- Results can be influenced by attitudes
- Language or vocabulary can be an issue
- People can be very concerned with how test results will be used
- Adults sometimes resent taking tests, which typically have a negative connotation

Techniques and Tips
- Look for established test
- If purchasing test, ask for reliability and validity information
- Make sure people know what will happen with the results of the test
- Evaluate how well-matched the original objectives of the test are to yours
- Does the measure seem appropriate for the age and ability level of the group being assessed?
- Ask if there have been problems with use of the test and if there are recommendations on how to address those problems
- Make scores available to test takers as soon as possible

7. Concept Mapping

Concept mapping is a technique that can be used to map knowledge. The mapping is intended to represent meaningful relationships between concepts in the form of propositions. Propositions are two or more concept labels linked by words in a semantic unit. For example, "The ocean is blue" is a concept map where "ocean" and "blue" are the two concepts linked by the valid proposition that the ocean *is* blue (Novak and Gowin, 1984).

Concept mapping can be done for several purposes:

- To generate ideas (brainstorming, etc.)
- To design a complex structure (long texts, hypermedia, large websites, etc.)
- To communicate complex ideas
- To aid learning by explicitly integrating new and old knowledge
- To assess understanding or diagnose misunderstanding

The following is a list of steps to demonstrate and then conduct concept mapping as an evaluation tool.

1. Select the ideas or concepts to be mapped. These may be lists of words, meaningful narratives or case studies, or other printed material.
2. Identify the key concept(s), that is, those concepts necessary for understanding the meaning of the material. Put the most inclusive concept at the head of a new list.
3. Continue listing in rank order, the next most general (inclusive) concepts. (There may be different orders among participants. This is okay because it illustrates that there is more than one way to see the meaning of the material.)
4. Begin constructing a concept map using the rank-ordered list as a guide in building the concept hierarchy. Create connecting phrases for lines between concepts.
5. Next identify cross-links between concepts in one section of the map and concepts in another part of the concept "tree." Select proposition words (linking words) to cross-link ideas.
6. Examine the map and reconstruct it if participants wish to rearrange concepts or links.
7. Discuss the scoring criteria (shown below), and score the concept map that the group developed. Identify possible structural changes that might improve the meaning or the score of the map.
8. Provide participants with the words, narrative, or case study information to be mapped. Ask participants to individually (or in small groups) construct a concept map using this information.
9. Collect and score the maps following the scoring process below.

Scoring criteria:

1. Propositions. Is the meaning relationship between two concepts indicated by the connecting line and linking word(s)? Is the relationship valid? For each meaningful, valid proposition shown, score 1 point.

2. Hierarchy. Does the map show a hierarchy? Is each subordinate concept more specific and less general than the concept(s) above it (in the context of the material being mapped)? Score 5 points for each valid level in the hierarchy.

3. Cross-links. Does the map show meaningful connections between one segment of the concept hierarchy and another segment? Is the relationship shown significant and valid? Score 10 points for each significant and valid cross-link. Score 2 points for each cross-link that is valid but does not illustrate a synthesis between sets of related concepts or propositions. Unique or creative cross-links may receive special recognition or extra points.

4. Example. Specific events or objects that are valid instances of those designated by the concept map label can be scored 1 point each. (These can be provided but are not circled because they are not concepts—only illustrations of the concept.)

5. The final score may be the total score from each map, or the total can be compared to an "ideal" or desired outcome concept map. This model establishes the criterion by which other maps will be rated. The total score for the criterion concept map represents 100 percent. Participant map scores are divided by the criterion map score to give a percentage for comparison. (Some participants may do better than the criterion map and receive a score greater than 100 percent.)

From: Novak and Gowin, 1984.

Links to concept mapping software can be found at
http://users.edte.utwente.nl/lanzing/cm_home.htm

8.   Rubric

A rubric is a set of criteria against which performance can be measured.

Benefits
- Focuses an observer's observations
- Makes a hard-to-quantify performance quantifiable
- Useful to assess what people do rather than just what they know
- Good for collecting time-series data
- An objective way to assess an activity
- Can help to ensure a consistent approach in evaluation
- Determines the extent to which the specified criteria have been reached
- Makes evaluation process consistent
- Provides benchmarks against which to document progress

Limitations
- Development can be time-consuming because it requires the identification of all the key elements of a performance
- Not flexible; could miss key elements if not listed on the rubric
- Can be subjective because it only assesses the activity at hand

Techniques and Tips
- As with any other data collection tool, avoid unclear language
- Avoid being excessively general; make sure the rubric addresses what is being assessed
- Use measurable criteria; be sure to use criteria that can be counted or at least marked as present or absent
- Select descriptors that mean something; poor, fair, good, and excellent need to either be defined or avoided

Rubrics can be created in a variety of forms and levels of complexity, however, they all contain common features that . . .

- Focus on measuring a stated **objective** (performance, behavior, or quality)
- Use a **range** to rate performance
- Contain specific performance characteristics arranged in levels indicating the **degree** to which a standard has been met

Evaluation Method Selection Matrix

The table below provides a convenient reference for the selection of appropriate evaluation data collection methods for different types of projects and programs.

Method Type versus Expected Outcomes

Evaluation Tool Outcomes	interview	focus group	survey and test	observation	concept map	rubric
changes in knowledge	good	poor	good	fair	good	poor
changes in attitudes	good	fair to poor	fair to poor	fair	fair	poor
changes in skills	poor	poor	poor	good	poor	good
changes in intent to behave/act	good	fair to poor	fair to poor	fair	poor	poor
changes in behavior/actions	good to fair	fair to poor	poor	good	poor	poor

Rating Scale: good = offers more benefits than limitations; fair = benefits and limitations are close to even; poor = offers more limitations than benefits
.

Selecting the Right Data Collection Method

- Select the method that's the easiest and least expensive way to provide data you can analyze and that will answer your questions.
- Select a method that maximizes advantages and minimizes disadvantages given the situation, audience, and resources.
- Time, money, and the skill and philosophy of the evaluator strongly influence method choices.

No method is perfect in all situations.

Triangulation

Because there is no single best data collection method, or approach, multiple sources and types of information offer the greatest insights. This approach is generally referred to as triangulation. It is an approach that incorporates data from various perspectives, such as above, below, and beside you in a hierarchy. By examining data collected by different methods, from different groups and in many, targeted populations, findings can be corroborated across data sets, which lessens the impacts of certain biases that are likely more prevalent in a single study. Triangulation, if done well, possesses both quantitative and qualitative information, considers current published literature in the field of interest, and considers the thoughts and ideas of experts in the field, when possible.

Reliability and Validity

Measures and methods that are poorly designed, chosen, or implemented can completely undermine the legitimacy and utility of an evaluation. Reliability and validity are each major issues that must be addressed when measuring progress towards, and eventually achievement of your program's desired outcomes. These two issues are briefly discussed below.

Reliability

Reliability refers to the extent to which your measurements produce the same results when used repeatedly. If you use multiple interviews, settings, or observers, will they consistently measure the same thing each time? If you design an instrument, will people interpret your questions the same way each time? Variation in measurement results is known as measurement error, which has the unfortunate effect of diluting or obscuring real differences in your measurement data. Successful programs can appear less successful than they actually are when unreliable measurement methods are employed. While information on reliability for many ready-made measures that evaluators use is available, it is not always safe to assume that an otherwise reliable measure will be reliable in your specific situation.

Ideally, your methods will produce identical results after multiple measurements. The most straightforward way to measure this, which is known as test-retest reliability, is to administer a measurement at least twice, at times when the outcome being measured should not change and results should thus be the same. No instrument, classification scheme, or counting procedure, however, is perfectly reliable. However, addressing sources of unreliability can reduce measurement error. The following is a list of common sources of unreliability in measuring outcomes:

- Natural variation in the way that participants respond to written or oral questions posed by evaluators
- Differences in the testing or measuring situation

- Differences in the way observers or interviewers administer a measure

- Sudden changes of opinion among respondents caused by mood swings or other specific events that transpire between the first and following measurements

Validity

The validity of a measure refers to the extent to which it measures what it is supposed to measure. Validity forces us to ask whether the measures for which we're collecting data truly are representative of the outcomes that we're seeking. While validity and its importance are obvious on a conceptual level, assessing the validity of a measure in

practice is challenging. Often, the validity of a measure is determined in large part by some subset of stakeholders with sophisticated knowledge in the subject area. If these stakeholders agree that a measure well represents an outcome, then that measure will be regarded as valid. Also, using multiple measures of an outcome helps to safeguard against the possibility of an invalid measure, and it also may serve to satisfy more diverse stakeholder groups.

Activity   Method

Selection

- Transfer your related performance measures to **Job Aid 7: Performance Measurement Data Collection** and select appropriate data collection methods.

Performance Measurement Data Collection

Directions:

1. Transfer two performance measure(s) from Job Aid 5 to the boxes below, and provide the additional detail requested.

2. Select appropriate data collection methods. Make your selection by referring to "Evaluation Method Selection Matrix" on p. 139 and "Some Data-Gathering Methods for Evaluation: Benefits and Limitations" table on p. 126 and record them in the "method" box. Select up to three methods for each measure and include one you do not traditionally use.

3. Then describe how you intend to use the method (e.g., when and where), analyze the data collected and address threats to reliability.

Performance Measure:	
Type of Data I/We Plan to Collect: ☐Quantitative ☐Qualitative ☐Both Level of Evaluation Demonstrated ☐Reactions/Satisfaction ☐Learning/Knowledge ☐Behavior/Application ☐Results ☐ROI Type of Outcome Being Measured: ☐Short Term ☐Mid-Term ☐Long Term	
Enter Method 1:	When and how will you use this method (e.g. dates or phase of project, remotely or in person)? Are there special considerations related to employing this method? From whom will you collect data? Using your evaluation question, related performance measures and other influences, draft some questions to support this method. What are your initial plans for analyzing the data? How will you address reliability?

Enter Method 2:	When and how will you use this method (e.g. dates or phase of project, remotely or in person)?
	Are there special considerations related to employing this method?
	From whom will you collect data?
	Using your evaluation question, related performance measures and other influences, draft some questions to support this method.
	What are your initial plans for analyzing the data?
	How will you address reliability?

Enter Method 3:	When and how will you use this method (e.g. dates or phase of project, remotely or in person)?
	Are there special considerations related to employing this method?
	From whom will you collect data?
	Using your evaluation question, related performance measures and other influences, draft some questions to support this method.
	What are your initial plans for analyzing the data?
	How will you address reliability?

Performance Measure:	
Type of Data I/We Plan to Collect: ☐Quantitative ☐Qualitative ☐Both Level of Evaluation Demonstrated ☐Reactions/Satisfaction ☐Learning/Knowledge ☐Behavior/Application ☐Results ☐ROI Type of Outcome Being Measured: ☐Short Term ☐Mid-Term ☐Long Term	
Enter Method 1:	When and how will you use this method (e.g. dates or phase of project, remotely or in person)? Are there special considerations related to employing this method? From whom will you collect data? Using your evaluation question, related performance measures and other influences, draft some questions to support this method. What are your initial plans for analyzing the data? How will you address reliability?

Enter Method 2:	When and how will you use this method (e.g. dates or phase of project, remotely or in person)?
	Are there special considerations related to employing this method?
	From whom will you collect data?
	Using your evaluation question, related performance measures and other influences, draft some questions to support this method.
	What are your initial plans for analyzing the data?
	How will you address reliability?

Enter Method 3:	When and how will you use this method (e.g. dates or phase of project, remotely or in person)?
	Are there special considerations related to employing this method?
	From whom will you collect data?
	Using your evaluation question, related performance measures and other influences, draft some questions to support this method.
	What are your initial plans for analyzing the data?
	How will you address reliability?

Communicating Results

OBJECTIVE

Generate ideas for the format and content of the evaluation report to demonstrate an understanding of the reporting needs and considerations that will facilitate sound decision-making by those who requested the evaluation.

Communicating Results

Need to report

Communicating results is a critical step in answering stakeholders' questions and providing meaningful information to your evaluation user. The evaluation report conveys information by providing a meaningful description of the ability and capacity of your program or project and associated accomplishments. The evaluation report also facilitates understanding, creates meaning, and supports decision-making.

Reporting Considerations

There are three broad goals in the development of your report. The first, and most basic, is to convey information. Building on this element is to nurture understanding and build meaning around the information. Finally, and most important, the information should be presented at a level that supports sound decision-making. Think about the following reporting considerations as the report is developed:

Audience – Your organization likely represents and serves a variety of stakeholder groups. Try to consider the critical informational needs of your user base as the report is written. This group likely has specific, targeted informational needs. Be sure to directly address the needs of this group to the greatest degree possible.

Purpose – There are certainly criteria set forth in which to respond when developing your evaluation report. Be sure to build evaluator awareness level and support to the highest degree possible on these measures. Demonstrate how your organization has improved over time and made progress toward long-term goals. Finally make sure that your organizational results were fully demonstrated.

Priority – Above all, the most important stakeholder group to satisfy is the one that is reviewing and making judgment calls based on the results of the evaluation report. Be sure to know as much about this group as possible: evaluation criteria, culture of their organization, who specifically is evaluating, and what their specific biases and preferences are.

Implications for content – When writing the report, assume that the reviewers and stakeholders that read the report do not possess a highly technical knowledge, such as data analysis methods, strategies for collection, or highly scientific content within the report narrative. Brief explanations of such items can often make a report much easier

to read and much friendlier to use. Additionally, it may provide critical information to a reviewer.

Time and Resources – Remember that good quality report writing takes time and, often, contributions from a number of individuals. Be sure to budget enough time for adequate contributions to be made, as well as editing.

Format – Be sure to consider the preferences of both your stakeholder and evaluator groups. While the evaluators are a critical group to please, the report will ideally be used long after the evaluation is concluded. Try to obtain evaluation reports from other groups that have been evaluated by the same institution. Additionally, use common terms, language, and headings found in materials provided by the evaluators. Using their own structure and vocabulary makes it a more difficult task for the evaluator to make criticisms!

Tips for Effective Messaging

Be clear about your communications goals – Know what you are trying to accomplish and your timeline. Be as specific as possible.

Know your audience – Is there more than one? Who are they? What is the audience's level of knowledge on the topic area? What are the audience's biases?

Understand why others should care about your issue – What are their concerns? What about your issue is important to them? What core values in your audience do these concerns speak to?

Use language that speaks to your audience – Are you speaking to a technical audience? How about academic? Novice?

Use case studies to illustrate and strengthen your message – Real data and tangible evidence can help illustrate and amplify your message.

Use words <u>and</u> graphics to tell your story – Graphics, tables, and pictures are highly effective in summarizing large volumes of information and should be included in your report.

Determine how you will get the message to your target audience – What are the points of access—mass media, community organizations, trade publications, special interest magazines, the Web, and so on?
(Adapted from the Biodiversity Project, (no date), Crafting effective messages.)

Content of Report

It is critical for the evaluation report to be as comprehensive as possible, while maintaining clarity and order. Reports composed of several specific sections often provide the greatest utility. Common sections in an evaluation report include the following:

Title page

Table of contents

Executive summary – The executive summary should describe the essence of the entire document in a single page. The language should be interesting and friendly to encourage further reading of the report contents.

Program description – The program description provides the context so that readers can judge appropriateness of the evaluation and conclusions. It includes the problem or situation statement, program rationale, intended program impacts, program resources, leadership of the program, and the target audience.

Purpose of evaluation – This section describes the questions addressed by the evaluation. Specific documentation of the issue, as well as initial assumptions, should be identified here.

Methods – The methods section provides a clear description of how the evaluation was conducted. It describes, in detail, all the work undertaken to collect the data upon which findings, discussion, and recommendations are based. It should contain enough detail for the evaluation to be replicated. Limitations of the evaluation should be included, with an explanation of biases in terms of how they may have affected evaluation findings.

Results – This section provides the reader with key findings upon which conclusions and recommendations are based. They should be reported concisely and without interpretation. Data should be presented objectively so that the reader can come to his or her own conclusion. Findings should be presented with the audience in mind. Graphics, descriptive paragraphs, and measures of central tendency should be included.

Conclusions and recommendations – The conclusions discuss plausible interpretations of the evaluation findings. The reader should be provided with meaning and context for the findings presented. Recommendations address significant issues supported by the report's findings and conclusions. Keep in mind that recommendations may or may not be included in the report, according to user preference. If recommendations are implemented, they often have significant impacts on financial and human resources.

From an ethical standpoint, it is important to determine whether the evaluator should make recommendations, or just present the facts. It may be useful in many instances for the actual organization to develop sound, realistic recommendations and actions following the evaluation. If recommendations are a desirable component of the report, they should incorporate areas for improvement, future opportunities, and funding possibilities. Whenever possible, the potential impact of implementing each recommendation should be addressed.

Although the reporting phase is essential, it does not mean that recommendations will be implemented, which is why it is important to maintain rapport with the program's stakeholders. Challenges to implementing the recommendations include resistance to change, time and personnel requirements, unempowered staff members, and lack of impact at the decision-making level.

Evaluation Plan Readiness Rubric

Directions:

Use this rubric to assess the readiness of your evaluation plan.

1. Gather Job Aids 1-7.
2. For each category, please rate the state of your plan.

- The **cumulative score** will indicate your plan's level of readiness after two days of training.

- The **individual scores** will indicate areas where preparation is nearly complete or areas that need further attention upon return to the office.

- Scores are for you or your team and the trainers only and will not be shared with the class.

Evaluation Plan Rubric			Rating
Evaluation Question (Job Aid 1)	Requestor	- Needs improvement =1 - Identified many - not just requestor/decision maker(s) = 2 - Identified only those who *need* the evaluation to make a decision affecting the program = 3	
	Needs To Know	- Needs improvement =1 - Needs articulated but lengthy and imprecise = 2 - Succinct articulation of *their* need and for what type of decision = 3	
	Prioritization	- Needs Improvement=1 - Too many priority questions =2 - One or few, clearly prioritized=3	
Context (Job Aid 2B)	Adequacy	Refer to Job Aid #2B and count the number of categories that are adequately addressed – write in #	
Program or Project Model Logical Connections (Logic Model)	Identification of "boxes" that link to the evaluation question	Connection between evaluation question and relevant part of logic model is: Loose =1 Sound=2 Strong=3	
	Definition and Logical Connection	Each string of boxes supporting the evaluation questions is: - Poorly defined with causal gaps=1 - Some weak definition and weak causal connections between boxes =2 - Well defined with strong cause and effect relationships between boxes=3	
Plausibility (Logic Model)	Realism & Completeness of Timelines	Time estimates are any of each of the following: - Incomplete, unrealistic, unfounded estimates =1 - Complete realistic, unfounded =2 - Complete, realistic and well founded =3	

Plausibility (Job Aid 3)	Credibility of Assumptions	- Flawed or outdated assumptions=1 - Credible, well-founded assumptions=2 - Well-founded assumptions articulated and compared to or are using evidence-based approaches=3	
Other Influences (Job Aid 4)	Sufficiency	- Insufficient accounting of internal and/or external influences =1 - Sufficient accounting of internal **or** external=2 - Sufficient accounting of internal **and** external =3	
Performance Measures (Job Aids 5 &6)	Supportive of evaluation question	Link to evaluation question: - needs improvement- some or many performance measures are irrelevant = 1 - adequate – supportive of evaluation question but could be improved = 2 - strong – handful of directly supportive performance measures = 3	
	Source Definition	How clearly defined are sources of data? - Needs improvement=1 - Adequately defined=2 - Clearly defined =3	
	Criteria of effective PM's	Choose the performance measure with the lowest total score and record the score.	
Data Analysis Considerations (Job Aid 7)	Instruments	- Uses one source of data=1 - Uses two sources of data=2 - Uses triangulation to gather data =3	
		Given the type of questions, the instrument choice(s) are: - Fair to poor = 1 - Mix of good and fair or poor =2 - All are rated good given the type of question =3	

	Methods	- Uniform – measures either all quantitative or all qualitative =1 - Mixed – makes use of both qualitative and quantitative measures = 3	
Reporting Considerations	Knowledge of Requestor Needs and Report format and outline	- No knowledge of evaluation requestor needs or preferences =1 - Knowledge of evaluation requestor needs and preferences but no plan for format =2 - Well developed outline and format selected based on needs of evaluation requestor=3	
Evaluation Plan Readiness	Total Score		

Score:

63- 52 – Share and confirm with evaluation requestors and get evaluating!

51-30 – Off to a good start, still some work to do to polish the plan.

< 29 – More preparation is needed before committing resources to an evaluation.

Summary

In these times of budgetary uncertainty, coastal professionals are continually faced with the challenges of evaluating their programs and projects, and determining whether progress is being made or stated goals have, in fact, been reached. For organizations that use logic models for planning, these challenges can also be approached systematically, using a well-designed evaluation that will not only determine merit and worth, but also provide an ongoing source of information that can help explain observed results and assist in decision-making. Not surprisingly, the evaluation process may have varying functions dependent on the audience, timing, specific questions to be addressed, and the resources available.

Depending on the circumstances for evaluation, there may be differing directions, roles, and needs. Equipped with a detailed program description, evaluation plan matrix, data and reporting considerations, planning templates, *and* insight into the evaluator's perspective, you now have the tools to do the type of evaluation that you desire (or that is mandated) and thus are prepared to efficiently conduct an evaluation that has the potential to yield meaningful results.

References Cited

Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In J. Kuhl and J. Beckman (Eds.), *Action-control: From cognition to behavior* (pp. 11- 39). Heidelberg, Germany: Springer. Retrieved November 1, 2007, from http://www.people.umass.edu/aizen/publications.html.

Andreason, A. (1995) *Marketing social change: Changing behavior to promote health, social development and the environment*. San Francisco: Jossey-Bass.

Bandura, A. (1989). Social cognitive theory. In R. Vasta (Ed.), *Annals of child development. Vol. 6. Six theories of child development* (pp. 1-60). Greenwich, CT: JAI Press. Retrieved October 31, 2007, from http://www.des.emory.edu/mfp/Bandura1989ACD.pdf.

Bickman, L. (2000). Summing Up Program Theory. *New Directions for Evaluation*, 87, 103-112. Fall 2000.

Biodiversity Project. (no date). Crafting effective messages. Retrieved from www.biodiversityproject.org/docs/publicationsandtipsheets/ craftingeffectivemessages_tipsheet.pdf

Family Health International. (2004). Behavior change: A summary of four major theories. Accessed November 16, 2007, at http://www.fhi.org/NR/rdonlyres/ ei26vbslpsidmahhxc332vwo3g233xsqw22er3vofqvrfjvubwyzclvqjcbdgexyzl3msu4mn6xv 5j/BCCSummaryFourMajorTheories.pdf.

Hines, J.M., Hungerford, H.R. & Tomera, A.N. (1986-87). Analysis and synthesis of research on responsible pro-environmental behavior: a meta analysis. *The Journal of Environmental Education, 18(2), 1-8*.

Hungerford, H.R., and Volk, T.L. (1990). Changing learner behavior through environmental education. *The Journal of Environmental Education, 21*(3), 8-21.

Kirkpatrick, D.L. (1994). *Evaluating training programs: The four levels.* San Francisco, CA: Berrett-Koehler.

Lefebvre, R. C., and Rochin L, (1977) Social marketing. In Glanz, K., Lewis, F.M., and Rimer, B.K. (Eds.), *Health behavior and health education: Theory, research, and practice* (pp 388). San Francisco: Jossey-Bass.

Levin, H.M., and McEwan, P.J. (2001). *Cost-effectiveness analysis: Methods and applications.* Thousand Oaks, CA: Sage Publications.

McKenzie-Mohr, D., and Smith, W. (1999). *Fostering sustainable behavior: An introduction to community-based social marketing*. Gabriola Island, B.C., Canada: New Society Publishers.

McNamara, C. (2008). Basic guide to program evaluation. The Management Assistance Program for Non-Profits (MAP). Available at http://managementhelp.org/evaluatn/fnl_eval.htm.

Monroe, Martha C. (2003). Two avenues for encouraging conservation behaviors, *Human Ecology Review, 10*(2).

Novak, J.D., and Gowin, D.B. (1984). *Learning how to learn*. Cambridge: Cambridge University Press.

National Science Foundation (NSF), Division of Research, Evaluation and Communication. 2002. *2002 User-friendly handbook of program evaluation.* Prepared by Joy Frechtling, Westat, Inc. Accessed April 2009 at *www.nsf.gov/pubs/2002/nsf02057/nsf02057.pdf*.
Rogers, E. (2003) *Diffusion of Innovations: Fifth Edition*. Toronto : Free Press.

Rogers, P.J., Petrosino, A., Huebner, T.A., and Hacsi, T.A. (2000*). Program theory in evaluation: Challenges and opportunities.* New Directions for Evaluation, No. 87. San Francisco: Josey–Bass.

Rossi, P.H., H. E. Freeman, and Lipsey, M.W. (1999). *Evaluation: A systematic approach,* 6th ed. London, Sage Publications.

Smith, M.F. (1989). *Evaluability assessment: A practical approach.* Kluwer Academic Publishers.

Stoel, D. (2004). The evaluation heavyweight match. *Training and Development Magazine*, *58*(1), 46-48.

Taylor-Powell, E., Jones, L., and Henert, E. (2002). Enhancing program performance with logic models. Retrieved November 2004 from the University of Wisconsin-Extension website: http://www.uwex.edu/ces/lmcourse/.

Taylor-Powell, E., and Renner, M. (2003). Analyzing qualitative data. Retrieved from the University of Wisconsin-Extension, Program Development and Evaluation, website at http://learningstore.uwex.edu/pdf/G3658-12.pdf.

University of Wisconsin-Extension. Program development and evaluation. Website accessed November 2004 at *www.uwex.edu/ces/pdande/*.

U.S. Dept. of Health and Human Services. (1996). Understanding and promoting physical activity. In *Physical activity and health: A report of the surgeon general* (pp. 211-215). Atlanta, GA: U.S. Dept. of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion. Retrieved October 17, 2007, from http://www.cdc.gov/nccdphp/sgr/chap6.htm.

Bibliography

Akers, R. L., Krohn, M. D., Lanza-Kaduce, L., and Radosevich, M. (August 1979). Social learning and deviant behavior: A specific test of a general theory. *American Sociological Review, 44*(4), 636-655. Retrieved October 31, 2007, from http://www.jstor.org/view/00031224/di974330/97p0630q/0.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84*, 191-215. Retrieved October 31, 2007, from http://www.kk.org/quantifiedself/Bandura%20(1977)%20Self-Efficacy.pdf.

Bickman, L. (1987). The functions of program theory. In L. Bickman (ed.), *Using program theory in evaluation.* New Directions for Program Evaluation, No. 33. San Francisco: Josey-Bass.

Chen, M., and Land, K. C. (1986). Testing the Health Belief Model: LISREL analysis of alternative models of causal relationships between health beliefs and preventive dental behavior. *Social Psychology Quarterly, 49*(1), 45-60. Retrieved October 31, 2007, from http://links.jstor.org/sici?sici=0190-2725(198603)49%3A1%3C45%3ATTHBML%3E2.0.CO%3B2-J.

Conrad, K. J., and Miller, T. Q. (1987). Measuring and testing program philosophy. In L. Bickman (ed.), *Using program theory in evaluation.* New Directions for Program Evaluation, No. 33. San Francisco: Josey-Bass.

Elton, L. (2003). Dissemination of innovations in higher education. *Tertiary Education and Management, 9*, 199-214.

Government of South Australia. Behaviour change tools for workplace recycling. Retrieved December 3, 2007, from http://www.zerowaste.sa.gov.au/greening_government/pdf/BehaviourChange.doc.

Jeffery, C. R. (September 1965). Criminal behavior and learning theory. *The Journal of Criminal Law, Criminology, and Police Science, 56*(3), 294-300. Retrieved December 4, 2007, from http://links.jstor.org/sici?sici=00220205%28196509%2956%3A3%3C294%3ACBALT%3E2.0.CO%3B2-4.

Knott, D. (2008). Achieving culture change: a Policy framework. Prime Minister's Strategy Unit, UK Cabinet Office. Retrieved May 14, 2009, from http://www.cabinetoffice.gov.uk/media/cabinetoffice/strategy/assets/culture_change_seminar.pdf

Kollmuss, A. and Agyeman, J. (2002). Mind the Gap: Why do people act environmentally and what are the barriers to pro-environmental behavior? *Environmental Education Research*, 8(3), 239 – 260.

National Institutes of Health Guide. (2003, January 13). Maintenance of long term behavioral change. Retrieved October 31, 2007, from http://grants.nih.gov/grants/guide/rfa-files/RFA-OB-03-003.html.

National Oceanic and Atmospheric Administration (NOAA), Coastal Services Center. *Introduction to survey design and delivery*. Charleston, SC: NOAA Coastal Services Center.

Nutbeam, D. (2000). Health literacy as a public health goal: A challenge for contemporary health education and communication strategies into the 21st century. *Health Promotion International, 15*(3), 259-267. Retrieved November 15, 2007, from http://heapro.oxfordjournals.org/cgi/reprint/15/3/259.

Rockman Et Al and the Edventure Group. Evaluation springboard. Website accessed April 2008 at http://www.evaluationspringboard.org/.

Rockwell, K., and C. Bennett. (2002). Targeting outcomes of programs (TOPS). Available at *http://citnews.unl.edu/TOP/english/synopsis.html.*

Rogers, P.J., Petrosino, A., Huebner, T.A., and Hacsi, T.A. 2000. Program theory in evaluation: Challenges and opportunities. New Directions for Evaluation, No. 87. San Francisco: Josey –Bass.

Scheirer, M. A. 1987. Program theory and implementation theory: Implications for evaluators. In L. Bickman (ed.), *Using program theory in evaluation.* New Directions for Program Evaluation, No. 33. San Francisco: Josey-Bass.

Shavelson, R.J., Lang, H., and Lewin, B. (1994). On concept maps as potential "authentic" assessments in science. CSE Technical Report 388. Los Angeles, CA: National Center for Research on Evaluation, Standards, and Student Testing (CRESST), August, 29pp. Accessed at *www.cresst.org/products/reports_set.htm*.

Skinner, B. F. (1953). *Science and human behavior.* New York: Free Press. Retrieved October 17, 2007, from http://www.bfskinner.org/SHBtext.pdf.

Torres, R.T., Preskill, H., and Piontek, M.E. 2005. *Evaluation strategies for communicating and reporting: Enhancing learning in organizations,* 2nd Edition. Thousand Oaks, CA: Sage Publications.

Appendices

Appendix 1: Glossary

Many of the following terms are not included in this manual. However, they are provided for working with others in the field of evaluation and may be helpful as you continue to read and learn more about evaluation.

Accessibility
The extent to which the structural and organizational arrangements facilitate participation in the program.

Accountability
The responsibility of program staff members to provide evidence to stakeholders and sponsors that a program is effective and in conformity with its coverage, service, and legal and fiscal requirements.

Accounting perspectives
Perspectives underlying decisions on which categories of goods and services to include as costs or benefits in an efficiency analysis.

Administrative standards
Stipulated achievement levels set by program administrators or other responsible parties, for example, intake for 90% of the referrals within one month. These levels may be set on the basis of past experience, the performance of comparable programs, or professional judgment.

Articulated program theory
An explicitly stated version of program theory that is spelled out in some detail as part of a program's documentation and identity or as a result of efforts by the evaluator and stakeholders to formulate the theory.

Assessment of program process
An evaluative study that answers questions about program operations, implementation, and service delivery. Also known as a *process evaluation* or an *implementation assessment.*

Assessment of program theory
An evaluative study that answers questions about the conceptualization and design of a program.

Attrition
The loss of outcome data measured on targets assigned to control or intervention groups, usually because targets cannot be located or refuse to contribute data.

Benefits
Positive program outcomes, usually translated into monetary terms in cost-benefit analysis or compared with costs in cost-effectiveness analysis. Benefits may include both direct and indirect outcomes.

Benefits-to-cost ratio
The total discounted benefits divided by the total discounted costs.

Bias
As applied to program coverage, the extent to which subgroups of a target population are reached unequally by a program.

Bias in coverage
The extent to which subgroups of a target population participate differentially in a program.

Black box evaluation
Evaluation of program outcomes without the benefit of an articulated program theory to provide insight into what is presumed to be causing those outcomes and why.

Catchment area
The geographic area served by a program.

Comprehensive evaluation
An assessment of a social program that covers the need for the program, its design, implementation, impact, and efficiency.

Conceptual utilization
Long-term, indirect utilization of the ideas and findings of an evaluation.

Confounding factors
Extraneous variables resulting in observed effects that obscure or exaggerate the true effects of an intervention.

Constructed control designs
Impact assessments in which there is not random assignment of program participants and nonparticipating targets. Rather, the groups are equated by matching or statistical procedures on characteristics that may be associated with program outcomes.

Control group
A group of targets that do not receive the program intervention and that is compared on outcome measures with one or more groups that do receive the intervention. Compare *intervention group.*

Cost-benefit analysis
Analytical procedure for determining the economic efficiency of a program, expressed as the relationship between costs and outcomes, usually measured in monetary terms.

Cost effectiveness
The efficacy of a program in achieving given intervention outcomes in relation to the program costs.

Cost-effectiveness analysis
Analytical procedure for determining the efficacy of a program in achieving given intervention outcomes in relation to the program costs.

Costs
Inputs, both direct and indirect, required to produce an intervention.

Coverage
The extent to which a program reaches its intended target population.

Cross-sectional designs
Studies in which data are collected at one point in time.

Design effects
The influence of the research methods and procedures on the estimate of the net effects of a program.

Direct (instrumental) utilization
Explicit utilization of specific ideas and findings of an evaluation by decision makers and other stakeholders.

Discounting
The treatment of time in valuing costs and benefits of a program in efficiency analyses, that is, the adjustment of costs and benefits to their present values, requiring a choice of discount rate and frame.

Distributional effects
Effects of programs that result in a redistribution of resources in the general population.

Effect size statistic
A statistical formulation of an estimate of program effect that expresses its magnitude in a standardized form that is comparable across outcome measures using different units or scales. Two of the most commonly used effect size statistics are the *standardized means difference* and the *odds ratio.*

Efficiency assessment
An evaluative study that answers questions about program costs in comparison to either the monetary value of its benefits or its effectiveness in terms of the changes brought about in the social conditions it addresses.

Empowerment evaluation
A participatory or collaborative evaluation in which the evaluator's role includes consultation and facilitation directed toward the development of the capabilities of the participating stakeholders to conduct evaluation on their own, to use it effectively for advocacy and change, and to have some influence on a program that affects their lives.

Evaluability assessment
Negotiation and investigation undertaken jointly by the evaluator, the evaluation sponsor, and possibly other stakeholders to determine whether a program meets the preconditions for evaluation and, if so, how the evaluation should be designed to ensure maximum utility.

Evaluand
The subject of an evaluation, typically a program or system rather than a person.

Evaluation questions
A set of questions developed by the evaluator, evaluation sponsor, and other stakeholders; the questions define the issues the evaluation will investigate and are stated in terms such that they can be answered using methods available to the evaluator in a way useful to stakeholders.

Evaluation sponsor
The person, group, or organization that requests or requires the evaluation and provides the resources to conduct it.

***Ex ante* efficiency analysis**
An efficiency (cost-benefit or cost-effectiveness) analysis undertaken prior to program implementation, usually as part of program planning, to estimate net outcomes in relation to costs.

Experimental group
A group of targets to whom an intervention is delivered and whose outcome measures are compared with those of control groups.

***Ex post* designs**
Impact designs undertaken after the delivery of the program to the intervention group, including secondary analyses making use of a quasi-experimental analytical approach.

Ex post efficiency analysis
An efficiency (cost-benefit or cost-effectiveness) analysis undertaken after a program's outcomes are known.

Externalities
Effects of a program that impose costs on persons or groups who are not targets.

Focus group
A small panel of persons selected for their knowledge or perspective on a topic of interest that is convened to discuss the topic with the assistance of a facilitator. The discussion is used to identify the important themes or to construct descriptive summaries of views and experiences on the focal topic.

Formative evaluation
Evaluative activities undertaken to furnish information that will guide program improvement.

Generalizability
The extent to which an impact assessment's findings can be extrapolated to similar programs or from the program as tested to the program as implemented.

Generic controls
Established measures of social processes, such as published test norms, that are used as comparisons with the outcomes of interventions.

Gross outcomes
The overall outcome after intervention, only part of which might actually be caused by the intervention.

Impact
See *program effect*.

Impact evaluation
An evaluative study that answers questions about program outcomes and impact on the social conditions it is intended to ameliorate.

Impact theory
A causal theory describing cause-and-effect sequences in which certain program activities are the instigating causes and certain social benefits are the effects they eventually produce.

Implementation failure
The program does not adequately perform the activities specified in the program design that are assumed to be necessary for bringing about the intended social improvements.

It includes situations in which no service, not enough service, or the wrong service is delivered, or the service varies excessively across the target population.

Implicit program theory
Assumptions and expectations inherent in a program's services and practices that have not been fully articulated and recorded.

Incidence
The number of new cases of a particular problem or condition that arise in a specified area during a specified period of time. Compare *prevalence.*

Independent evaluation
An evaluation in which the evaluator has the primary responsibility for developing the evaluation plan, conducting the evaluation, and disseminating the results.

Internal rate of return
The calculated value for the discount rate necessary for total discounted program benefits to equal total discounted program costs.

Intervention
Deliberate entry into a situation or issue in order to influence events or prevent undesirable consequences.

Intervention group
A group of targets that receive an intervention and whose outcome measures are compared with those of one or more control groups. Compare *control group*.

Key informants
Persons whose personal or professional position gives them a knowledgeable perspective on the nature and scope of a social problem or a target population and whose views are obtained during a needs assessment.

Management information system (MIS)
A data system, usually computerized, that routinely collects and reports information about the delivery of services to clients and, often, billing, costs, diagnostic and demographic information, and outcome status.

Matching
Constructing a control group by selecting targets (individually or as aggregates) that are identical on specified characteristics to those in an intervention group except for receipt of the intervention.

Measurement validity
The extent to which a measure reflects the concept it is intended to measure.

Mediator variable
In an impact assessment, a proximal outcome that changes as a result of exposure to the program and then, in turn, influences a more distal outcome. The mediator is thus an intervening variable that provides a link in the causal sequence through which the program brings about change in the distal outcome.

Meta-analysis
An analysis of effect size statistics derived from the quantitative results of multiple studies of the same or similar interventions for the purpose of summarizing and comparing the findings of that set of studies.

Moderator variable
In an impact assessment, a variable, such as gender or age, that characterizes subgroups for which program effects may differ.

Needs assessment
An evaluative study that answers questions about the social conditions a program is intended to address and the need for the program.

Net benefits
The total discounted benefits minus the total discounted costs. Also called *net rate of return.*

Net effects
The effects of an intervention that can be attributed uniquely to it, that is, with the influence of confounding effected from other sources controlled or removed. Also called *net outcomes* and *net impacts*.

Nonequivalent comparison design
A quasi-experimental design in which intervention and control groups are constructed through some means other than random assignment.

Odds ratio
An effect size statistic that expresses the odds of a successful outcome for the intervention group relative to that of the control group.

Opportunity costs
The value of opportunities forgone because of an intervention program.

Organizational plan
Assumptions and expectations about what the program must do to bring about the transactions between the target population and the program that will produce the intended changes in social conditions. The program's organizational plan is articulated from the perspective of program management and encompasses both the functions and activities the program is expected to perform and the human, financial, and physical resources required for that performance.

Outcome
The state of the target population or the social conditions that a program is expected to have changed.

Outcome change
The difference between outcome levels at different points in time. See also *outcome level.*

Outcome level
The status of an outcome at some point in time. See also *outcome.*

Outcome monitoring
The continual measurement and reporting of indicators of the status of the social conditions a program is accountable for improving.

Participatory or collaborative evaluation
An evaluation organized as a team project in which the evaluator and representatives of one or more stakeholder groups work collaboratively in developing the evaluation plan, conducting the evaluation, or disseminating and using the results.

Performance criterion
The standard against which a dimension of program performance is compared so that it can be evaluated.

Performance measure
The collection, reporting, and interpretation of performance indicators related to how well programs perform, particularly with regard to the delivery of service (outputs) and achievement of results (outcomes).

Policy significance
The significance of an evaluator's findings for policy and program development (as opposed to their statistical significance).

Policy space
The set of policy alternatives that are within the bounds of acceptability to policymakers at a given point in time.

Population at risk
The individuals or units in a specified area with characteristics indicating that they have a significant probability of having or developing a particular condition.

Population in need
The individuals or units in a specified area that currently manifest a particular problematic condition.

Pre-post design
A reflective control design in which only one measure is taken before and after the intervention.

Prevalence
The total number of existing cases with a particular condition in a specified area at a specified time. Compare *incidence.*

Primary dissemination
Dissemination of the detailed findings of an evaluation to sponsors and technical audiences.

Process evaluation
A form of program evaluation designed to determine whether the program is delivered as intended to the target recipients. Also known as implementation *assessment*.

Process theory
The combination of the program's organizational plan and its service utilization plan into an overall description of the assumptions and expectations about how the program is supposed to operate.

Program effect
That portion of an outcome change that can be attributed uniquely to a program, that is, with the influence of other sources controlled or removed; also termed the program's impact. See also *outcome change.*

Program evaluation
The use of social research methods to systematically investigate the effectiveness of social intervention programs in ways that are adapted to their political and organizational environments and are designed to inform social action in ways that improve social conditions.

Program goal
A statement, usually general and abstract, of a desired state toward which a program is directed. Compare with *program objectives*.

Program monitoring
The systematic documentation of aspects of program performance that are indicative of whether the program is functioning as intended or according to design. The results are used to configure a control variable for selection bias to be incorporated into the second-stage statistical model that estimates the effects of intervention on an outcome.

Program objectives
Specific, operationalized statements detailing the desired accomplishments of a program.

Program process monitoring
Process evaluation that is done repeatedly over time.

Program process theory
The combination of the program's organizational plan and its service utilization plan into an overall description of the assumptions and expectations about how the program is supposed to operate.

Program theory
The set of assumptions about the manner in which a program relates to the social benefits it is expected to produce and the strategy and tactics the program has adopted to achieve its goals and objectives. Within program theory we can distinguish *impact theory,* relating to the nature of the change in social conditions brought about by program action, and *process theory,* which depicts the program's organizational plan and service utilization plan.

Proxy measure
A variable used to stand in for one that is difficult to measure directly.

Quasi-experiment
An impact research design in which "experimental" and "control" groups are formed by a procedure other than random assignment.

Randomization
Assignment of potential targets to intervention and control groups on the basis of chance so that every unit in a target population has the same probability as any other to be selected for either group.

Randomized field experiment
A research design conducted in a program setting in which intervention and control groups are formed by random assignment and compared on outcome measures to determine the effects of the intervention. See also *control group; intervention group.*

Rate
The occurrence or existence of a particular condition expressed as a proportion of units in the relevant population (e.g., deaths per 1,000 adults).

Reflective controls
Measures of an outcome variable taken on participating targets before intervention and used as control observations. See also *pre-post design; time-series design.*

Regression-discontinuity design
A quasi-experimental design in which selection into the intervention or control group is based on the observed value on an appropriate quantitative scale, with targets scoring above a designated cutting point on that scale assigned to one group and those scoring below assigned to the other. Also called *cutting point design*.

Reliability
The extent to which a measure produces the same results when used repeatedly to measure the same thing.

Reproducibility
The extent to which the findings of a study can be reproduced by other researchers in replications.

Sample survey
A survey administered to a sample of units in the population. The results are extrapolated to the entire population of interest by statistical projections.

Secondary dissemination
Dissemination of summarized often simplified findings of evaluations to audiences composed of stakeholders.

Secondary effects
Effects of a program that impose costs on persons or groups who are not targets.

Selection bias
Systematic under- or overestimation of program effects that results from uncontrolled differences between the intervention and control groups that would result in differences on the outcome if neither group received intervention.

Selection modeling
Creation of a multivariate statistical model to "predict" the probability of selection into intervention or control groups in a nonequivalent comparison groups in a quasi-experiment. The results of this analysis are used to configure a control variable for selection bias to be incorporated into a second-stage statistical model investigating net effects of intervention on outcome.

Sensitivity
Assumptions and expectations about how the target population will make initial contact with the program and be engaged with it through the completion of the intended services. In its simplest form, a service utilization plan describes a sequence of events through which the intended clients are expected to interact with the intended services.

Service utilization plan
The assumptions and expectations about how the target population will make initial contact with the program and be engaged with it through the completion of the intended services. In simplest form, a service utilization plan describes the sequence of events through which the intended clients are expected to interact with the intended services.

Shadow controls
Expert and participant judgments used to estimate net impact.

Shadow prices
Imputed or estimated costs of goods and services not valued accurately in the marketplace. Shadow prices also are used when markets are inappropriate due to regulation or externalities. Also known as *accounting prices.*

Snowball sampling
A nonprobability sampling method in which each person interviewed is asked to suggest additional knowledgeable people for interviewing. The process continues until no new names are suggested.

Social indicator
Periodic measurements designed to track the course of a social condition over time.

Social program; social intervention
An organized, planned, and usually ongoing effort designed to ameliorate a social problem or improve social conditions.

Social research methods
Procedures for studying social behavior devised by social scientists that are based on systematic observation and logical rules for drawing inferences from those observations.

Specification error
Error in impact estimation arising out of the use of an inappropriate or incomplete statistical model.

Specificity
The extent to which the criteria used to identify the target population result in the exclusion of individuals or units who do not have or will not develop the condition to which the program is directed.

Stakeholders
Individuals, groups, or organizations having a significant interest in how well a program functions, for instance, those with decision-making authority over the program, funders and sponsors, administrators and personnel, and clients or intended beneficiaries.

Standardized means difference
An effect size statistic that expresses the mean outcome difference between intervention and control group in standard deviation units.

Statistical controls
The use of statistical techniques to adjust estimates of program effects for bias resulting from differences between intervention and control groups that are related to the outcome. The differences to be controlled by these techniques must be represented in measured variables that can be included in the statistical analysis.

Statistical control designs
Impact designs without random assignment of program participants and nonparticipants. Rather, the groups are statistically equated, usually by some multivariate statistical procedure, so that they resemble each other as much as possible on characteristics associated with program outcomes.

Statistical power
The probability that an observed program effect will be statistically significant when, in fact, it represents a real effect. If a real effect is not found to be statistically significant, a Type II error results. Thus, statistical power is one minus the probability of a Type II error. See also *Type II error.*

Stochastic effects
Measurement fluctuations attributable to chance.

Summative evaluation
Evaluative activities undertaken to render a summary judgment on certain critical aspects of the program's performance, for instance, to determine if specific goals and objectives were met.

Survey
Systematic collection of information from a defined population, usually by means of interviews or questionnaire administered to a sample of units in the population.

Target
The unit (individual, family, community, etc.) to which a program intervention is directed. All such units within the area served by a program comprise its target population.

Theory failure
Program is implemented as planned but its services do not produce the immediate effects on the participants that are expected or the ultimate social benefits that are intended, or both.

Time-series design
A reflective control design that relies on a number of repeated measurements of the outcome variable taken before and after an intervention.

Type I error
A statistical conclusion error in which a program effect estimate is found to be statistically significant, in fact, the program has no effect on the target population.

Type II error
A statistical conclusion error in which a program effect estimate is not found to be statistically significant, in fact, the program does have an effect on the target population.

Units of analysis
The units on which outcome measures are taken in an impact assessment and, correspondingly, the units on which data are available for analysis. The units of analysis may be individual persons but can also be families, neighborhoods, communities, organizations, political jurisdictions, geographic areas, or any other such entities.

Utilization of evaluation
The use of concepts and findings of an evaluation by decision makers and stakeholders, whether at the day-to-day management level or at broader funding or policy levels.

Validity
The extent to which a measure actually measures what it is intended to measure.

Appendix 2: Factors that Influence the Scope of an Evaluation

The scope of an evaluation depends on several key factors.

Stakeholders/Audience
- Who are they?
    - → Internal vs. external. Internal stakeholders may include project management staff members and administration. The evaluation will likely not be conducted without their support.
- What do they need to know?
    - → What will lead to their continued support of the project?
    - → What do they need the evaluation to accomplish?
- How will they use the results?
- What resources do they have to contribute?

Purpose
- Why is the evaluation being done?
- What do you want to be able to decide as a result of the evaluation?

Resources
- What do you have available?
- Where or from whom do we collect data and information? From which sources should we collect information?
- What scale are you working with? Keep in mind that will determine scope.
- Be sure to include resource needs for evaluation in grant application.
- General rule of thumb – allocate at least 5-10% of total program budget for evaluation.
- How can partnerships extend available resources? For example, can the local university provide data analysis if my organization collects the data?

Evaluator
- Who is the evaluator? Are you working with an internal staff member or an external consultant? Keep in mind that each will bring advantages as well as biases.
- What is the evaluator's experience or familiarity regarding your project type, e.g.. healthcare vs. natural resources?
- Was the evaluator a part of designing the project to be evaluated?

Time Frame
- Within what length of time does the evaluation need to be completed?
- How does the allotted time influence scope and scale of evaluation while not sacrificing validity?

Appendix 3: Evaluation Report Checklist

EVALUATION REPORT CHECKLIST*

Gary Miron
September 2004

The Evaluation Report Checklist has two intended applications that are related to evaluation management: (1) a tool to guide a discussion between evaluators and their clients regarding the preferred contents of evaluation reports and (2) a tool to provide formative feedback to report writers. Evaluators can self-rate their own progress during the writing phase. They can also use the checklist to identify weaknesses or areas that need to be addressed in their evaluation report(s). When two or more persons work on the same report, the checklist can serve as a tool to delegate, coordinate, and monitor progress among the contributors.

This checklist is not intended to be used as a metaevaluation tool. Evaluation reports differ greatly in terms of purpose, budget, expectations, and needs of the client. If one were to use this checklist to evaluate actual reports or draw comparisons across reports, one would need to consider or weight the checkpoints within sections and to weight the relative importance and value of each section.

This checklist draws upon and reflects *The Program Evaluation Standards* (Joint Committee on Standards for Educational Evaluation, 1994).

This checklist is being provided as a free service to the user. The provider of the checklist has not modified or adapted the checklist to fit the specific needs of the user, and the user is executing his or her own discretion and judgment in using the checklist. The provider of the checklist makes no representations or warranties that this checklist is fit for the particular purpose contemplated by users and specifically disclaims any such warranties or representations.

Instructions: Rate each component of the report using the following rubrics. Fill in the circle or place a check mark in the cell that corresponds to your rating on each checkpoint. If the item or checkpoint is not applicable to the report, indicate the "NA" cell to the far right. Additional checkpoints may be added as agreed upon by those using the checklist

1=Not addressed, 2=Partially addressed, 3=Fully addressed, NA=Not applicable

	1	2	3	NA
1. Title Page				
A. Title is sufficiently clear and concise to facilitate indexing				
B. Author(s)' names and affiliations are identified				
C. Date of preparation is included				
D. Title identifies what was evaluated, including target population, if applicable				
E. Name of client or funder(s) is identified				
F. Text and material on title page are clearly and properly arranged				
G.				
Comments:				

	1	2	3	NA
2. Executive Summary				
A. Description of program/project				
B. Evaluation questions and purpose of the evaluation				
C. Brief description of methods and analytical strategy (if appropriate)				
D. Summary of main findings				
E. Implications of findings				
F. Recommendations, if appropriate				
G.				
Comments:				

		1	2	3		NA
3. Table of Contents and Other Sections That Preface the Report						- -
	A. Table of contents contains at least all first and second level headers in the reports					
	B. Titles and page numbers are accurate					
	C. Lists of tables, figures, and appendices are included, if appropriate					
	D. List of acronyms or abbreviations is included, if appropriate					
	E. Acknowledgments section references sponsors, data collectors, informants, contributors to the report, research assistants, reviewers of the report, etc.					
	F.					
	Comments:					

		1	2	3		NA
4. Introduction and Background						- -
	A. Purpose of evaluation and evaluation questions, if not covered in the methodology section					
	B. Description of the program/project or phenomenon being evaluated (including goals and historical context, if appropriate)					
	C. Identification of target population for the program and relevant audiences and stakeholders for the evaluation					
	D. Review of related research					
	E. Overview & description of report structure					
	F.					
	Comments:					

		1	**2**	**3**	**NA**
5. Methodology					– –
	A. Purpose of evaluation and evaluation questions, if not covered in the introduction				
	B. Evaluation approach or model being used, as well as rationale for the approach or model				
	C. Design of the evaluation, including sample sizes and timing of data collection				
	D. Methods of data collection, including description of data collection instruments				
	E. Sources of information and data				
	F. Limitations of the evaluation (e.g., limitations related to methods, data sources, potential sources of bias, etc.)				
	G.				
	Comments:				

		1	**2**	**3**	**NA**
6. Results Chapters					– –
	A. Details of the evaluation findings are clearly and logically described				
	B. Charts, tables, and graphs are understandable and appropriately and consistently labeled				
	C. Discussion of evaluation findings is objective and includes both negative and positive findings				
	D. All evaluation questions are addressed or an explanation is included for questions that could not be answered				
	E. Findings are adequately justified				
	F.				
	Comments:				

		1	2	3	NA
7. Summary, Conclusion, and Recommendations					- -
	A. Summaries of findings are included in each chapter or altogether in a summary chapter				
	B. Discussion and interpretation of findings are included				
	C. Summary and conclusion fairly reflect the findings				
	D. Judgments about the program that cover merit and worth are included				
	E. If appropriate, recommendations are included and are based on findings in the report				
	F.				
	Comments:				

		1	2	3	NA
8. References and Appendices					- -
	A. A suitable style or format (e.g., APA) is used consistently for all references				
	B. References are free of errors				
	C. References cover all in-text citations				
	D. All appendices referenced in the text are included in the appendix section, in the order they are referenced				
	E. Data and information in the appendices are clearly presented and explained				
	F.				
	Comments:				

Appendix 4: Evaluation References and Resources List:
Cross-Referenced Categories (compiled by Word Craft)

Attitudes and Attitude Changes

Ajzen, I., and Fishbein, M. (1980). *Understanding attitudes and predicting social behavior*. Englewood Cliffs, NJ: Prentice-Hall, Inc.

Armstrong, J.B., and Impara, J.C. (1991). The impact of an environmental education program on knowledge and attitude. *Journal of Environmental Education, 22*, 36-40.

Ballantyne, R., Fien, J., and Packer, J. (2001). Program effectiveness in facilitating intergenerational influence in environmental education: Lessons from the field. *The Journal of Environmental Education, 32*(4), 8-15.

Barney, E.C., Mintzes, J.J., and Yen, C.-F. (2005). Assessing knowledge, attitudes, and behavior toward charismatic megafauna: The case of dolphins. *The Journal of Environmental Education, 36*(2), 41-55.

Bazerman, M.H., Messick, D.M., Tenbrunsel, A.E., and Wade-Benzoni, K.A. (Eds.). (1997). *Environment, ethics, and behavior*. San Francisco, CA: The New Lexington Press.

Bechtel, R.B., Verdugo, V.C., and Pinheiro, J.D.Q. (1999). Environmental belief systems: United States, Brazil and Mexico. *Journal of Cross-Cultural Psychology, 30*(1), 122-128.

Bixler, R.D., Floyd, M.R., and Hammitt, W.E. (2002). Environmental socialization: Quantitative tests of the childhood play hypothesis. *Environment and Behavior, 34*(6), 795-818.

Bowler, P.A., Kaiser, F.G., and Hartig, T. (1999). A role for ecological restoration work in university environmental education. *The Journal of Environmental Education, 30*(4), 19-26.

Bradley, J.C., Waliczek, T.M., and Zajicek, J.M. (1999). Relationship between environmental knowledge and environmental attitude of high school students. *Journal of Environmental Education, 30*(3), 17-21.

Bunting, T.E., and Cousins, L.R. (1985). Environmental dispositions among school-age children: A preliminary investigation. *Environment and Behavior, 17*(6), 725-768.

Burger, J., Sanchez, J., Gibbons, J.W., and Gochfeld, M. (1998). Gender differences in recreational use, environmental attitudes, and perceptions of future land use at the Savannah River Site. *Environment and Behavior, 30*(4), 472-486.

Chawla, L. (1998). Significant life experiences revisited: A review of research on sources of environmental sensitivity. *Journal of Environmental Education, 4*(4), 369-382.

Chawla, L. (2001). Significant life experiences revisited once again: Response to Vol. 5(4) 'Five critical commentaries on significant life experience research in environmental education'. *Environmental Education Research, 7*(4), 451-461.

Clayton, S. (2003). Environmental identity: A conceptual and an operational definition. In S. Clayton and S. Opotow (Eds.), *Identity and the natural environment: The psychological significance of nature* (pp. 45-65). Cambridge, MA: The MIT Press.

Cordano, M., Welcomer, S.A., and Scherer, R.F. (2003). An analysis of the predictive validity of the New Ecological Paradigm Scale. *The Journal of Environmental Education, 34*(3), 22-28.

Cronin-Jones, L.L. (2000). The effectiveness of schoolyards as sites for elementary science instruction. *School Science and Mathematics, 100*(4), 203-211.

DiEnno, C.M., and Hilton, S.C. (2005). High school students' knowledge, attitudes, and levels of enjoyment of an environmental education unit on nonnative plants. *The Journal of Environmental Education, 37*(1), 13-25.

Dietz, T., Fitzgerald, A., and Shwom, R. (2005). Environmental values. In P. A. Matson (Ed.), *Annual Review of Environment and Resources* (Vol. 30, pp. 335-372). Palo Alto, CA: Annual Reviews.

Eagles, P.F.J., and Demare, R. (1999). Factors influencing children's environmental attitudes. *The Journal of Environmental Education, 30*(4), 33-37.

Eagly, A.H., and Chaiken, S. (1993). *The psychology of attitudes*. Fort Worth: Harcourt Brace College Publishers.

Euler, E. (1989). A comparative study of the effectiveness of a local environmental center's program for urban sixth-graders' environmental knowledge and attitudes. *Children's Environments Quarterly, 6*(2/3), 34-41.

Fortner, R.W., and Teates, T.G. (1980). Baseline studies for marine education: Experience related to marine knowledge and attitudes. *Journal of Environmental Education, 11*(4), 11-19.

Garner, L.C., and Gallo, M.A. (2005). Field trips and their effect on student achievement and attitudes. *Journal of College Science Teaching, 34*(5), 14-17.

Gillett, D., Thomas, G., Skok, R., and McLaughlin, T. (1991). The effects of wilderness camping and hiking on the self-concept and environmental attitudes and knowledge of twelfth graders. *Journal of Environmental Education, 22*(3), 33-34.

Haluza-Delay, R. (2001). Nothing here to care about: Participant constructions of nature following a 12-day wilderness program. *The Journal of Environmental Education, 32*(4), 43-48.

Hanna, G. (1995). Wilderness-related environmental outcomes of adventure and ecology education programming. *Journal of Environmental Education, 27*(1), 21-32.

Harvey, M.R. (1989/1990). The relationship between children's experiences with vegetation on school grounds and their environmental attitudes. *Journal of Environmental Education, 21*(2), 9-15.

Hungerford, H.R., and Volk, T.L. (1990). Changing learner behavior through environmental education. *The Journal of Environmental Education, 21*(3), 8-21.

Iozzi, L.A. (1989). What research says to the educator. Part one: Environmental education and the affective domain. *Journal of Environmental Education, 20*(3), 6-13.

Iozzi, L.A. (1989). What research says to the educator. Part two: Environmental education and the affective domain. *The Journal of Environmental Education, 20*(4), 6-13.

Jordan, J.R., Hungerford, H.R., and Tomera, A.N. (1986). Effects of two residential environment workshops of high school students. *Journal of Environmental Education, 18*(1), 15-22.

Jurin, R.R., and Fortner, R.W. (2002). Symbolic beliefs as barriers to responsible environment behavior. *Environmental Education Research, 8*(4), 373-394.

Kalof, L., Dietz, T., Guagnano, G., and Stern, P.C. (2002). Race, gender and environmentalism: The atypical values and beliefs of white men. *Race, Gender and Class, 9*(2), 1.

Kaplan, S. (2000). Human nature and environmentally responsible behavior. *Journal of Social Issues, 56*(3), 491-508.

Kellert, S. (1985). Attitudes toward animals: Age-related development among children. *Journal of Environmental Education, 16*(3), 29-35.

Kidd, A.H., and Kidd, R.M. (1990). Social and environmental influences on children's attitudes toward pets. *Psychological Reports, 67*, 807-818.

Kidd, A.H., and Kidd, R.M. (1996). Developmental factors leading to positive attitudes toward wildlife and conservation. *Applied Animal Behavior Science, 47*, 119-125.

Knapp, D., and Poff, R. (2001). A qualitative analysis of the immediate and short-term impact of an environmental interpretive program. *Environmental Education Research, 7*(1), 55-65.

Lalonde, R., and Jackson, E. (2002). The New Environmental Paradigm scale: Has it outlived its usefulness? *The Journal of Environmental Education, 33*(4), 28-36.

Lasso de la Vega, E. (2004). *Awareness, knowledge, and attitude about environmental education: Responses from environmental specialists, high school instructors, students, and parents.* Dissertation, College of Education, University of Central Florida, Orlando, FL.

Leeming, F.C., Dwyer, W.O., and Bracken, B.A. (1995). Children's environmental attitude and knowledge scale: Construction and validation. *The Journal of Environmental Education, 26*(3), 22-31.

Leeming, F.C., Porter, B.E., Dwyer, W., and others (1996). Effects of participation in class activities on children's environmental attitudes and knowledge. *Journal of Environmental Education, 28*(2), 33-42.

Liu, S.-T., and Kaplan, M.S. (2006). An intergenerational approach for enriching children's environmental attitudes and knowledge. *Applied Environmental Education and Communication, 5*, 9-20.

Looy, H., and Wood, J.R. (2006). Attitudes toward invertebrates: Are educational "Bug Banquets" effective? *The Journal of Environmental Education, 37*(2), 37-48.

Lyons, E., and Breakwell, G.M. (1994). Factors predicting environmental concern and indifference in 13- to 16-year-olds. *Environment and Behavior, 26*(2), 223-238.

Malkus, A.J., and Musser, L.M. (1993). Children and the new 3 Rs (reduce, reuse, recycle): Attitudes toward the environment. Paper presented at the Biennial Meeting of the Society for Research in Child Development, New Orleans, LA.

Margadant-van Arcken, M. (1989). Environmental education, children and animals. *Anthrozoos, 3*(1), 14-19.

Mayer, F.S., and Frantz, C.M. (2004). The connectedness to nature scale: A measure of individuals' feeling in community with nature. *Journal of Environmental Psychology, 24*, 503-515.

Meinhold, J.L., and Malkus, A.J. (2005). Adolescent environmental behaviors: Can knowledge, attitudes and self-efficacy make a difference? *Environment and Behavior, 37*(4), 511-532.

Moscardo, G., and Pearce, P.L. (1986). Visitor centres and environmental interpretation: An exploration of the relationships among visitor enjoyment, understanding and mindfulness. *Journal of Environmental Psychology, 1986*(6), 89-108.

Musser, L.M., and Diamond, K.E. (1999). The Children's attitudes toward the environment scale for preschool children. *The Journal of Environmental Education, 30*(2), 23-30.

Musser, L.M., and Malkus, A.J. (1994). The Children's attitudes toward the environment scale. *Journal of Environmental Education, 25*(3), 22-26.

Myers, O.E., Jr., Saunders, C.D., and Garrett, E. (2003). What do children think animals need? Aesthetic and psycho-social conceptions. *Environmental Education Research, 9*(3), 305-325.

Myers, O.E., Jr., Saunders, C.D., and Garrett, E. (2004). What do children think animals need? Developmental trends. *Environmental Education Research, 10*(4), 545-562.

Newhouse, N. (1990). Implications of attitude and behavior research for environmental conservation. *Journal of Environmental Education, 22*(1), 26-32.

Noe, F., and Snow, R. (1990). Hispanic cultural influence on environmental concern. *Journal of Environmental Education, 21*(2), 27-34.

Palmberg, I.E., and Kuru, J. (2000). Outdoor activities as a basis for environmental responsibility. *Journal of Environmental Education, 31*(4), 32-36.

Parker, J.D., and McDonough, M.H. (1999). Environmentalism of African Americans: An analysis of the subculture and barriers theories. *Environment and Behavior, 31*(2), 155-177.

Parsons, C. (1998). Changing environmental attitudes: What the research suggests. In *AZA Annual Conference Proceedings*. Wheeling, WV: Association of Zoos and Aquariums.

Pooley, J.A., and O'Connor, M. (2000). Environmental education and attitudes: Emotions and beliefs are what is needed. *Environment and Behavior, 32*(5), 711-723.

Ramsey, J.M. (1993). The effects of issue investigation and action training on eighth-grade

students' environmental behavior. *The Journal of Environmental Education, 24*(3), 31-36.

Randler, C., I, A., and Kern, J. (2005). Cognitive and emotional evaluation of an amphibian conservation program for elementary school students. *The Journal of Environmental Education, 37*(1), 43-52.

Rideout, B.E. (2005). The effect of a brief environmental problems module on endorsement of the New Ecological Paradigm in college students. *The Journal of Environmental Education, 37*(1), 3-11.

Riechard, D.E., and McGarrity, J. (1994). Early adolescents' perceptions of relative risk from ten societal and environmental hazards. *Journal of Environmental Education, 26*(1), 16-23.

Roper Starch Worldwide. (1994). *Environmental attitudes and behaviors of American youth*. Washington, DC: National Environmental Education and Training Foundation (NEETF). Available at eelink.net/ROPER/one.html.

Ryan, C. (1991). The effect of a conservation program on schoolchildren's attitudes toward the environment. *Journal of Environmental Education, 22*(4), 30-35.

Saunders, C. (2003). The emerging field of conservation psychology. *Human Ecology Review, 10*(2), 137-149.

Saunders, C.D., and Myers, O.E., Jr. (Eds.). (2003). *Human Ecology Review Special Issue— Conservation Psychology*, *10*(2).

Schultz, P.W., and Zelezny, L. (2003). Reframing environmental messages to be congruent with American values. *Human Ecology Review, 10*(2).

Schultz, P.W. (2001). The structure of environmental concern: Concern for self, other people, and the biosphere. *Journal of Environmental Psychology, 21*, 327-339.

Schultz, P.W. (2002). Environmental attitudes and behaviors across cultures. In W. J. Lonner, D. L. Dinnel, S. A. Hayes and D. N. Sattler (Eds.), *Online Readings in Psychology and Culture (Unit 8, Ch. 4)*. Bellingham, WA: Center for Cross-Cultural Research, Western Washington University. Available at http://www.wwu.edu/~culture.

Schultz, P.W., Shriver, C., Tabanico, J.J., and Khazian, A.M. (2004). Implicit connections with nature. *Journal of Environmental Psychology, 24*, 31-42.

Schultz, P.W., Unipan, J.B., and Gambra, R.J. (2000). Acculturation and ecological worldview among Latino Americans. *The Journal of Environmental Education, 31*(2), 22-27.

Sebba, R. (1991). The landscapes of childhood: The reflection of childhood's environment in adult memories and in children's attitudes. *Environment and Behavior, 23*(4), 395-422.

Shean, G.D., and Shei, T. (1995). The values of student environmentalists. *The Journal of Psychology, 129*(5), 559-564.

Sia, A.P. (1985). Selected predictors of responsible environmental behavior: An analysis. *Journal of Environmental Education, 17*(2), 31-40.

Siemer, W.F., and Knuth, B.A. (2001). Effects of fishing education programs on antecedents of responsible environmental behavior. *The Journal of Environmental Education, 32*(4), 23-29.

Sivek, D.J. (2002). Environmental sensitivity among Wisconsin high school students. *Environmental Education Research, 8*(2), 155-170.

Smith-Sebasto, N.J., and Walker, L.M. (2005). Toward a grounded theory for residential environmental education: A case study of the New Jersey School of Conservation. *The Journal of Environmental Education, 37*(1), 27-42.

Stern, P.C. (2000). Toward a coherent theory of environmentally significant behavior. *Journal of Social Issues, 56*(3), 407-424.

Stoinski, T.S., Allen, M.T., Bloomsmith, M.A., and others (2002). Educating zoo visitors about complex environmental issues: Should we do it and how? *Curator, 45*(2), 129-143.

Swanagan, J.S. (2000). Factors influencing zoo visitors' conservation attitudes and behavior. *The Journal of Environmental Education, 31*(4), 26-31.

Tanner, T. (1980). Significant life experiences: A new research area in environmental education. *The Journal of Environmental Education, 11*(4), 20-24.

Tanner, T. (1998). Choosing the right subjects in significant life experiences research. *Environmental Education Research, 4*(4), 399-417.

Teisl, M.F., and O'Brien, K. (2003). Who cares and who acts? Outdoor recreationists exhibit different levels of environmental concern and behavior. *Environment and Behavior, 35*(4), 506-522.

Thomas, J.A., and Hairston, R.V. (2003). Adolescent students' images of an environmental scientist: An opportunity for constructivist teaching. *Electronic Journal of Science Education, 7*(4). Available at http://unr.edu/homepage/crowther/ejse/ejsev7n4.html.

Thomashow, C. (2002). Adolescents and ecological identity: Attending to wild nature. In P. H. Kahn, Jr. and S. R. Kellert (Eds.), *Children and nature: Psychological, sociocultural, and evolutionary investigations* (pp. 259-278). Cambridge, MA: The MIT Press.

Thomashow, M. (1995). *Ecological identity: Becoming a reflective environmentalist*. Cambridge, MA: The MIT Press.

Thompson, S.C.G., and Barton, M.A. (1994). Ecocentric and anthropocentric attitudes toward the environment. *Journal of Environmental Psychology, 14*, 149-157.

Thurber, C.A., and Malinowski, J.C. (1999). Environmental correlates of negative emotions in children. *Environment and Behavior, 31*(4), 487-513.

Tikka, P., Kuitunen, M., and Tynys, S. (2000). Effects of educational background on students' attitudes, activity levels, and knowledge concerning the environment. *Journal of Environmental Education, 31*(13), 12.

Vining, J. (2003). The connection to other animals and caring for nature. *Human Ecology Review, 10*(2), 87-99.

Vivanco, L.A. (2004). The work of environmentalism in an age of televisual adventures. *Cultural Dynamics, 16*(1), 5-27.

Whittaker, M., Segura, G.M., and Bowler, S. (2003, April 3-6). *Racial/ethnic group attitudes towards environmental protection in California: Is "environmentalism" still a white phenomenon?* Paper presented at the Annual Meeting of the Midwest Political Science Association, Chicago, IL.

Wilhelm, S.A., and Schneider, I.E. (2005). Diverse urban youth's nature: Implications for environmental education. *Applied Environmental Education and Communication, 4*, 103-113.

Yerkes, R., and Haras, K. (1997). *Outdoor education and environmental responsibility.* ERIC Digests Report (EDO-RC-97-6) available from www.eric.ed.gov.

Zimmermann, L.K. (1996). Knowledge, affect, and the environment: 15 years of research (1979-1993). *The Journal of Environmental Education, 27*(3), 41-44.

Zimmermann, L.K. (1996). The development of an environmental values short form. *The Journal of Environmental Education, 28*(1), 32-37.

Behaviors/Behavior Changes

Ajzen, I., and Fishbein, M. (1980). *Understanding Attitudes and Predicting Social Behavior*. Englewood Cliffs, NJ: Prentice-Hall, Inc.

Asch, J., and Shore, B.M. (1975). Conservation behavior as the outcome of environmental education. *The Journal of Environmental Education, 6*(4), 25-33.

Ballantyne, R., Fien, J., and Packer, J. (2001). Program effectiveness in facilitating intergenerational influence in environmental education: Lessons from the field. *The Journal of Environmental Education, 32*(4), 8-15.

Barney, E.C., Mintzes, J.J., and Yen, C.-F. (2005). Assessing knowledge, attitudes, and behavior toward charismatic megafauna: The case of dolphins. *The Journal of Environmental Education, 36*(2), 41-55.

Bazerman, M.H., Messick, D.M., Tenbrunsel, A.E., and Wade-Benzoni, K.A. (Eds.). (1997). *Environment, ethics, and behavior*. San Francisco, CA: The New Lexington Press.

Bishop, K., and Scott, W. (1998). Deconstructing action competence: Developing a case for a more scientifically-attentive environmental education. *Public Understanding of Science, 7*, 225-236.

Bowler, P.A., Kaiser, F.G., and Hartig, T. (1999). A role for ecological restoration work in university environmental education. *The Journal of Environmental Education, 30*(4), 19-26.

Chawla, L. (1999). Life paths into effective environmental action. *Journal of Environmental Education, 31*(1), 15-27.

Chawla, L. (2001). Significant life experiences revisited once again: Response to Vol. 5(4) 'Five critical commentaries on significant life experience research in environmental education'. *Environmental Education Research, 7*(4), 451-461.

Clayton, S., and Brook, A. (2005). Can psychology help save the world? A model for conservation psychology. *Analyses of Social Issues and Public Policy, 5*(1), 87-102.

Cleveland, M., Kalamas, M., and Laroche, M. (2005). Shades of green: Linking environmental locus of control and pro-environmental behaviors. *Journal of Consumer Marketing, 22*(4), 198-212.

Cordano, M., Welcomer, S.A., and Scherer, R.F. (2003). An analysis of the predictive validity of the New Ecological Paradigm Scale. *The Journal of Environmental Education, 34*(3), 22-28.

Culen, G.R., and Mony, P.R.S. (2003). Assessing environmental literacy in a nonformal youth program. *The Journal of Environmental Education, 34*(4), 26-28.

Culen, G.R., and Volk, T.L. (2000). Effects of an extended case study on environmental behavior and associated variables in seventh- and eighth-grade students. *The Journal of Environmental Education, 31*(2), 9-15.

de Young, R. (2000). Expanding and evaluating motives for environmentally responsible behavior. *Journal of Social Issues, 56*(3), 509-526.

Dwyer, W., Leeming, F.C., Cobern, M.K., and others (1993). Critical review of behavioral interventions to preserve the environment: Research since 1980. *Environment and Behavior, 25*(3), 275-321.

Emmons, K.M. (1997). Perspectives on environmental action: Reflection and revision through practical experience. *The Journal of Environmental Education, 29*(1), 34-44.

Gollwitzer, P.M., and Bargh, J.A. (Eds.). (1996). *The psychology of action*. New York, NY: The Guilford Press.

Gotch, C., and Hall, T. (2004). Understanding nature-related behaviors among children through a Theory of Reasoned Action approach. *Environmental Education Research, 10*(2), 157-177.

Hanna, G. (1995). Wilderness-related environmental outcomes of adventure and ecology education programming. *Journal of Environmental Education, 27*(1), 21-32.

Hewitt, P. (1997). Games in instruction leading to environmentally responsible behavior. *Journal of Environmental Education, 28*(3), 35-37.

Hungerford, H.R., Litherland, R.A., Peyton, R.B., and others (1996). *Investigating and Evaluating Environmental Issues and Actions: Skill development program*. Champaign, IL: Stipes

Publishing LLC.

Hungerford, H.R., and Volk, T.L. (1990). Changing learner behavior through environmental education. *The Journal of Environmental Education, 21*(3), 8-21.

Hwang, Y.-H., Kim, S.-I., and Jeng, J.-M. (2000). Examining the causal relationships among selected antecedents of responsible environmental behavior. *The Journal of Environmental Education, 31*(4), 19-25.

Jacobson, S.K., McDuff, M.D., and Monroe, M.C. (2006). *Conservation education and outreach techniques*. New York, NY: Oxford University Press.

Jordan, J.R., Hungerford, H.R., and Tomera, A.N. (1986). Effects of two residential environment workshops of high school students. *Journal of Environmental Education, 18*(1), 15-22.

Jurin, R.R., and Fortner, R.W. (2002). Symbolic beliefs as barriers to responsible environment behavior. *Environmental Education Research, 8*(4), 373-394.

Kals, E., and Ittner, H. (2003). Children's environmental identity: Indicators and behavioral impacts. In S. Clayton and S. Opotow (Eds.), *Identity and the natural environment: The psychological significance of nature* (pp. 135-157). Cambridge, MA: The MIT Press.

Kals, E., Schumacher, D., and Montada, L. (1999). Emotional affinity toward nature as a motivational basis to protect nature. *Environment and Behavior, 31*(2), 178-202.

Kaplan, S. (2000). Human nature and environmentally responsible behavior. *Journal of Social Issues, 56*(3), 491-508.

Kotler, P., and Roberto, E.L. (1989). *Social marketing: Strategies for changing public behavior*. New York, NY: The Free Press, a Division of Macmillan, Inc.

Lewis, B.A. (1998). *The kid's guide to social action: How to solve the social problems you choose— and turn creative thinking into positive action*. Minneapolis, MN: Free Spirit Publishing Inc.

Maloney, M.P., and Ward, M.P. (1973). Ecology: Let's hear from the people. *American Psychologist, 28*, 583-586.

Marcinkowski, T. (2004). *An overview of an issue and action instruction program for stewardship education*. Retrieved January 2005, from http://208.59.58.124/educational/BPE8.pdf.

McKenzie-Mohr, D. (2000). Promoting sustainable behavior: An introduction to community-based social marketing. *Journal of Social Issues, 56*(3), 543-554.

Meinhold, J.L., and Malkus, A.J. (2005). Adolescent environmental behaviors: Can knowledge, attitudes and self-efficacy make a difference? *Environment and Behavior, 37*(4), 511-532.

Miller, B.A. (1980). *Internal locus of control as a prerequisite to environmental action taking: An assessment of the Youth Conservation Corps.* Unpublished thesis, Michigan State University, East Lansing, Michigan.

Monroe, M.C. (2003). Two avenues for encouraging conservation behaviors. *Human Ecology Review, 10*(2), 113-125.

Newhouse, N. (1990). Implications of attitude and behavior research for environmental conservation. *Journal of Environmental Education, 22*(1), 26-32.

Palmberg, I.E., and Kuru, J. (2000). Outdoor activities as a basis for environmental responsibility. *Journal of Environmental Education, 31*(4), 32-36.

Ramsey, J., Hungerford, H.R., and Tomera, A.N. (1981). The effects of environmental action and environmental case study instruction on the overt environmental behavior of eighth-grade students. *The Journal of Environmental Education, 13*(1), 24-29.

Ramsey, J.M. (1993). The effects of issue investigation and action training on eighth-grade students' environmental behavior. *The Journal of Environmental Education, 24*(3), 31-36.

Roper Starch Worldwide. (1994). *Environmental attitudes and behaviors of American youth*.

Washington, DC: National Environmental Education and Training Foundation (NEETF). Available at eelink.net/ROPER/one.html.

Saunders, C. (2003). The emerging field of conservation psychology. *Human Ecology Review, 10*(2), 137-149.

Saunders, C., Brook, A.T., and Myers, O.E., Jr. (2006). Using psychology to save biodiversity and human well-being. *Conservation Biology, 20*(3), 702-705.

Saunders, C.D., and Myers, O.E., Jr. (Eds.). (2003). *Human Ecology Review Special Issue— Conservation Psychology, 10*(2).

Schultz, P.W. (2002). Environmental attitudes and behaviors across cultures. In W. J. Lonner, D. L. Dinnel, S. A. Hayes, and D. N. Sattler (Eds.), *Online readings in psychology and culture (Unit 8, Ch. 4)*. Bellingham, WA: Center for Cross-Cultural Research, Western Washington University.

Sia, A.P. (1985). Selected predictors of responsible environmental behavior: An analysis. *Journal of Environmental Education, 17*(2), 31-40.

Siemer, W.F., and Knuth, B.A. (2001). Effects of fishing education programs on antecedents of responsible environmental behavior. *The Journal of Environmental Education, 32*(4), 23-29.

Smith-Sebasto, N.J. (1992). The Revised Perceived Environmental Control Measure (RPECM): A review and analysis. *Journal of Environmental Education, 23*(2), 24-33.

Smith-Sebasto, N.J. (1994). Designing a Likert-style scale to predict environmentally responsible behavior in undergraduate students: A multistep process. *Journal of Environmental Education, 39*(2), 4-14.

Smith-Sebasto, N.J., and Fortner, R.W. (1994). The Environmental Action Internal Control Index. *Journal of Environmental Education, 25*(4), 23-29.

Stapp, W.B., Wals, A.E.J., and Stankorb, S.L. (1996). *Environmental education for empowerment: Action research and community problem solving*. Dubuque, IA: Kendall/Hunt Publishing Company.

Stern, P.C. (2000). Toward a coherent theory of environmentally significant behavior. *Journal of Social Issues, 56*(3), 407-424.

Swanagan, J.S. (2000). Factors influencing zoo visitors' conservation attitudes and behavior. *The Journal of Environmental Education, 31*(4), 26-31.

Teisl, M.F., and O'Brien, K. (2003). Who cares and who acts? Outdoor recreationists exhibit different levels of environmental concern and behavior. *Environment and Behavior, 35*(4), 506-522.

Tikka, P., Kuitunen, M., and Tynys, S. (2000). Effects of educational background on students' attitudes, activity levels, and knowledge concerning the environment. *Journal of Environmental Education, 31*(13), 12.

Vaske, J.J., and Kobrin, K.C. (2001). Place attachment and environmentally responsible behavior. *The Journal of Environmental Education, 32*(4), 16-21.

Villacorta, M., Koestner, R., and Lekes, N. (2003). Further validation of the Motivation Toward the Environment Scale. *Environment and Behavior, 35*(4), 486-505.

Westervelt, M.O., and Llewellyn, L.G. (1985). *Youth and wildlife: The beliefs and behaviors of fifth and sixth grade students regarding non-domestic animals*. Washington, DC: U.S. Fish and Wildlife Service.

Children

Bell, P., Bricker, L.A., Lee, T.R., and others (2006, April 3). *Understanding the cultural foundations of children's biological knowledge: Insights from everyday cognition research.* Paper

presented at the National Association for Research in Science Teaching, San Francisco, CA. Available at http://life-slc.org/?p=109.

Butts, D. P., and Jones, H. L. (1966). Inquiry training and problem solving in elementary school children. *Research in Science Teaching 4*(1): 21-27.

Elstgeest, J. (1985). The right question at the right time. In W. Harlen (Ed.), *Primary science: Taking the plunge* (pp. 36-46). Oxford, England: Heinemann Educational Publishers.

Engel, S. (1991). The world is a white blanket: Children write about nature. *Children's Environments Quarterly, 8*(2), 42-45.

Engel, S. (1999). *The stories children tell: Making sense of the narratives of childhood*. New York: W.H. Freeman and Company.

Fisman, L. (2005). The effects of local learning on environmental awareness in children: An empirical investigation. *The Journal of Environmental Education, 36*(3), 39-50.

Gallas, K. (1995). *Talking their way into science: Hearing children's questions and theories, responding with curricula*. New York, NY: Teachers College Press, Columbia University.

Greig, A., and Taylor, J. (1999). *Doing research with children*. Thousand Oaks, CA: Sage Publications.

Harlen, W. (Ed.). (1985). *Primary science: Taking the plunge*. Oxford: Heinemann Educational Publishers.

Hyun, E. (2005). How is young children's intellectual culture of perceiving nature different from adults'? *Environmental Education Research, 11*(2), 199-214.

Kals, E., and Ittner, H. (2003). Children's environmental identity: Indicators and behavioral impacts. In S. Clayton and S. Opotow (Eds.), *Identity and the Natural Environment: The psychological significance of nature* (pp. 135-157). Cambridge, MA: The MIT Press.

Kellert, S.R., and Vollbracht, C. (2000). *A review of literature and research relating to the learning impacts on children of zoological parks and aquariums*. New Haven, CN: Yale University School of Forestry and Environmental Studies.

Kellert, S.R., and Westervelt, M.O. (1983). *Children's attitudes, knowledge and behaviors toward animals*. U. S. Government Printing Office: 0-405-522/1101: U. S. Fish and Wildlife Service.

Kidd, A.H., and Kidd, R.M. (1996). Developmental factors leading to positive attitudes toward wildlife and conservation. *Applied Animal Behavior Science, 47*, 119-125.

Loughland, T., Reid, A., and Petocz, P. (2002). Young people's concepts of environment: A phenomenographic analysis. *Environmental Education Research, 8*(2), 187-197.

Louv, R. (2005). *Last child in the woods: Saving our children from nature-deficit disorder*. Chapel Hill, NC: Algonquin Books of Chapel Hill.

Manoli, C.C., Johnson, B., and Dunlap, R. (2005, April 11). *Assessing children's views of the environment: Modifying the New Ecological Paradigm Scale for use with children.* Paper presented at the Annual meeting of the American Educational Research Association (AERA), Montreal, Quebec.

Meng, E., and Doran, R. L. (1990). "What research says about appropriate methods of assessment." *Science and Children*, September, 42-45.

Moore, R.C., Goltsman, S.M., and Iacofano, D.S. (Eds.). (1992). *Play for all guidelines: Planning, design and management of outdoor play settings for all children*. Berkeley, CA: MIG Communications.

Myers, G. (1998). *Children and animals: Social development and our connections to other species*. Boulder, CO: Westview Press.

Myers, O.E., Jr., Saunders, C.D., and Garrett, E. (2003). What do children think animals need? Aesthetic and psycho-social conceptions. *Environmental Education Research, 9*(3), 305-325.

Myers, O.E., Jr., Saunders, C.D., and Garrett, E. (2004). What do children think animals need? Developmental trends. *Environmental Education Research, 10*(4), 545-562.

Nabhan, G. P. (1997). *Cultures of habitat: On nature, culture and story*. Washington, D.C.: Counterpoint.

Nabhan, G.P., and Trimble, S. (1994). *The Geography of childhood: Why children need wild places*. Boston, MA: Beacon Press.

Paris, S.G., and Hapgood, S.E. (2002). Children learning with objects in informal learning environments. In S. G. Paris (Ed.), *Perspectives on object-centered learning in museums* (pp. 37-54). Mahwah, NJ: Lawrence Erlbaum Associates, Publishers.

Rejeski, D. W. (1982). Children look at nature: Environmental perception and education. *The Journal of Environmental Education 13*(4), 27-40.

Ryan, C. (1991). The effect of a conservation program on schoolchildren's attitudes toward the environment. *Journal of Environmental Education 22*(4), 30-35.

Sebba, R. (1991). The landscapes of childhood: The reflection of childhood's environment in adult memories and in children's attitudes. *Environment and Behavior 23*(4), 395-422.

Smith-Sebasto, N.J., and Walker, L.M. (2005). Toward a grounded theory for residential environmental education: A case study of the New Jersey School of Conservation. *The Journal of Environmental Education, 37*(1), 27-42.

Stine, S. (1997). *Landscapes for learning: Creating outdoor environments for children and youth*. New York, NY: John Wiley and Sons, Inc.

Cognitive/Knowledge Changes

Armstrong, J. B., and Impara, J. C. (1991). The impact of an environmental education program on knowledge and attitude. *Journal of Environmental Education, 22*, 36-40.

Barney, E.C., Mintzes, J.J., and Yen, C.-F. (2005). Assessing knowledge, attitudes, and behavior toward charismatic megafauna: The case of dolphins. *The Journal of Environmental Education, 36*(2), 41-55.

Bell, P., Bricker, L.A., Lee, T.R., and others (2006, April 3). *Understanding the cultural foundations of children's biological knowledge: Insights from everyday cognition research.* Paper presented at the National Association for Research in Science Teaching, San Francisco, CA. Available at http://life-slc.org/?p=109.

Bogan, M.B., and Kromrey, J.D. (1996). Measuring the environmental literacy of high school students. *Florida Journal of Educational Research, 36*(1). Available only online at www.coedu.usf.edu/fjer/1996/1996_Bogan.htm.

Bradley, J.C., Waliczek, T.M., and Zajicek, J.M. (1999). Relationship between environmental knowledge and environmental attitude of high school students. *Journal of Environmental Education, 30*(3), 17-21.

Brody, M. (1996). An assessment of 4th-, 8th-, and 11th-grade students' environmental science knowledge related to Oregon's marine resources. *Journal of Environmental Education, 27*(3), 21.

Chipeniuk, R. (1995). Childhood foraging as a means of acquiring competent human cognition about biodiversity. *Environment and Behavior, 27*(4), 490-512.

DiEnno, C.M., and Hilton, S.C. (2005). High school students' knowledge, attitudes, and levels of enjoyment of an environmental education unit on nonnative plants. *The Journal of Environmental Education, 37*(1), 13-25.

Euler, E. (1989). A comparative study of the effectiveness of a local environmental center's program for urban sixth-graders' environmental knowledge and attitudes. *Children's*

Environments Quarterly, 6(2/3), 34-41.

Fisman, L. (2005). The effects of local learning on environmental awareness in children: An empirical investigation. *The Journal of Environmental Education, 36*(3), 39-50.

Fortner, R. W., and Teates, T. G. (1980). Baseline studies for marine education: Experience related to marine knowledge and attitudes. *Journal of Environmental Education 11*(4), 11-19.

Fortner, R., and Mayer, V. (1991). Repeated measures of students' marine and Great Lakes awareness. *Journal of Environmental Education 23*(1, Fall), 30-35.

Gambro, J.S., and Switzky, H.N. (1996). A national survey of high school students' environmental knowledge. *Journal of Environmental Education, 27*(3), 28-34.

Gambro, J.S., and Switzky, H.N. (1999). Variables associated with American high school students' knowledge of environmental issues related to energy and pollution. *Journal of Environmental Education, 30*(2), 15-23.

Gambro, J.S., and Switzy, H.N. (1992, February). *Locus of control as a motivational determinant of environmental knowledge in high school.* Paper presented at the annual meeting of the International Association for Cognitive Education, Riverside, CA.

Gillett, D., Thomas, G., Skok, R., and McLaughlin, T. (1991). The effects of wilderness camping and hiking on the self-concept and environmental attitudes and knowledge of twelfth graders. *Journal of Environmental Education, 22*(3), 33-34.

Hanna, G. (1995). Wilderness-related environmental outcomes of adventure and ecology education programming. *Journal of Environmental Education, 27*(1), 21-32.

Hyun, E. (2005). How is young children's intellectual culture of perceiving nature different from adults'? *Environmental Education Research, 11*(2), 199-214.

Jordan, J.R., Hungerford, H.R., and Tomera, A.N. (1986). Effects of two residential environment workshops of high school students. *Journal of Environmental Education, 18*(1), 15-22.

Kellert, S.R., and Vollbracht, C. (2000). *A review of literature and research relating to the learning impacts on children of zoological parks and aquariums*. New Haven, CN: Yale University School of Forestry and Environmental Studies.

Lasso de la Vega, E. (2004). *Awareness, knowledge, and attitude about environmental education: Responses from environmental specialists, high school instructors, students, and parents.* Dissertation, College of Education, University of Central Florida, Orlando, FL.

Leeming, F. C., Dwyer, W. O., and Bracken, B. A. (1995). Children's environmental attitude and knowledge scale: Construction and validation. *The Journal of Environmental Education 26*(3): 22-31.

Leeming, F.C., Porter, B.E., Dwyer, W., and others (1996). Effects of participation in class activities on children's environmental attitudes and knowledge. *Journal of Environmental Education, 28*(2), 33-42.

Meinhold, J.L., and Malkus, A.J. (2005). Adolescent environmental behaviors: Can knowledge, attitudes and self-efficacy make a difference? *Environment and Behavior, 37*(4), 511-532.

Morrone, M., Mancl, K., and Carr, K. (2001). Development of a metric to test group differences in ecological knowledge as one component of environmental literacy. *The Journal of Environmental Education, 32*(4), 33-42.

Musser, L.M., and Malkus, A.J. (1994). The Children's attitudes toward the environment scale. *Journal of Environmental Education, 25*(3), 22-26.

Myers, O.E., Jr., Saunders, C.D.,and Garrett, E. (2004). What do children think animals need? Developmental trends. *Environmental Education Research, 10*(4), 545-562.

Ramsey, J., Hungerford, H. R., and Tomera, A. N. (1981). The effects of environmental action and environmental case study instruction on the overt environmental behavior of eighth-grade students. *Journal of Environmental Education 13*, 24-29.

Randler, C., Ilg, A., and Kern, J. (2005). Cognitive and emotional evaluation of an amphibian conservation program for elementary school students. *The Journal of Environmental Education, 37*(1), 43-52.

Rejeski, D. W. (1982). Children look at nature: Environmental perception and education. *The Journal of Environmental Education 13*(4), 27-40.

Stronck, D. R. (1983). The comparative effects of different museum tours on children's attitudes and learning. *Journal of Research in Science Teaching 20*(4), 283-290.

Tikka, P., Kuitunen, M., and Tynys, S. (2000). Effects of educational background on students' attitudes, activity levels, and knowledge concerning the environment. *Journal of Environmental Education, 31*(13), 12.

Zimmermann, L. K. (1996). Knowledge, affect, and the environment: 15 years of research (1979-1993). *The Journal of Environmental Education, 27*(3), 41-44.

Concept Maps

Barney, E.C., Mintzes, J.J., and Yen, C.-F. (2005). Assessing knowledge, attitudes, and behavior toward charismatic megafauna: The case of dolphins. *The Journal of Environmental Education, 36*(2), 41-55.

Hibberd, R., Jones, A., and Morris, E. (2002). *The use of concept mapping as a means to promote and assess knowledge acquisition*. Report No. 202. Milton Keynes, U.K.: CALRG (Computers and Learning Research Group), The Open University. Available at http://iet.open.ac.uk/research/calrg/

National Center for Research on Evaluation Standards and Student Testing (CRESST). *Reports*. Retrieved March 2005 from http://www.cse.ucla.edu/products/reports_set.htm.

Novak, J.D. (1998). *Learning, creating, and using knowledge: Concept maps as facilitative tools in schools and corporations*. Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

Novak, J.D., and Cañas, A.J. (2006). *The theory underlying concept maps and how to construct them*. Technical Report IHMC Cmap Tools 2006-01. Pensacola, FL: Florida Institute for Human and Machine Cognition. Available at http://cmap.ihmc.us/Publications/ResearchPapers/TheoryCmaps/TheoryUnderlyingConcept Maps.htm

Novak, J.D., and Gowin, D.B. (1984). *Learning how to learn*. Cambridge: Cambridge University Press.

Rice, D.C., Ryan, J.M., and Samson, S.M. (1998). Using concept maps to assess student learning in the science classroom: Must different methods compete? *Journal of Research in Science Teaching, 35*(10), 1103-1127.

Shavelson, R.J., Lang, H., and Lewin, B. (1994). On concept maps as potential "authentic" assessments in science. CSE Technical Report 388. Los Angeles, CA: National Center for Research on Evaluation, Standards, and Student Testing (CRESST), August, 29pp. Available at http://www.cresst.org/products/reports_set.htm.

Stanford Education Assessment Library. (2002, May 17, 2002). *Reports and papers*. Retrieved March 2005, from http://www.stanford.edu/dept/SUSE/SEAL/Reports_Papers/Paper.htm.

University of Illinois Urbana-Champaign Discovery System Online. (2002, August 2002). *Kinds of concept maps*. Retrieved March 2005 from http://classes.aces.uiuc.edu/ACES100/Mind/c-m2.html.

Conservation Skills/Actions

Ajzen, I., and Fishbein, M. (1980). *Understanding Attitudes and Predicting Social Behavior*. Englewood Cliffs, NJ: Prentice-Hall, Inc.

Arvai, J.L., Campbell, V.E.A., Baird, A., and Rivers, L. (2004). Teaching students to make better decisions about the environment: Lessons from the decision sciences. *The Journal of Environmental Education, 36*(1), 33-44.

Asch, J., and Shore, B. M. (1975). Conservation behavior as the outcome of environmental education. *The Journal of Environmental Education, 6*(4), 25-33.

Bazerman, M. H., Messick, D. M., Tenbrunsel, A. E., and Wade-Benzoni, K. A. (1997). *Environment, ethics, and behavior*. San Francisco, CA: The New Lexington Press.

Bishop, K., and Scott, W. (1998). Deconstructing action competence: Developing a case for a more scientifically-attentive environmental education. *Public Understanding of Science, 7*, 225-236.

Bowler, P.A., Kaiser, F.G., and Hartig, T. (1999). A role for ecological restoration work in university environmental education. *The Journal of Environmental Education, 30*(4), 19-26.

Chawla, L. (1999). Life paths into effective environmental action. *Journal of Environmental Education, 31*(1), 15-27.

Dwyer, W., Leeming, F. C., Cobern, M. K., Porter, B. E., and Jackson, J. M. (1993). Critical review of behavioral interventions to preserve the environment: Research since 1980. *Environment and Behavior, 25*(3), 275-321.

Ernst, J.A., and Monroe, M. (2004). The effects of environmental-based education on students' critical thinking skills and disposition toward critical thinking. *Environmental Education Research, 10*(4), 507-522.

Gollwitzer, P. M., and Bargh, J. A. (1996). *The psychology of action*. New York, NY: The Guilford Press.

Gough, A. (2005). Sustainable schools: Renovating educational processes. *Applied Environmental Education and Communication, 4*, 339-351.

Hungerford, H. R., and Volk, T. L. (1990). Changing learner behavior through environmental education. *The Journal of Environmental Education, 21*(3), 8-21.

Hungerford, H. R., Litherland, R. A., Peyton, R. B., Ramsey, J. M., and Volk, T. L. (1996). *Investigating and evaluating environmental issues and actions: Skill development program*. Champaign, IL: Stipes Publishing LLC.

Jacobson, S.K., McDuff, M.D., and Monroe, M.C. (2006). *Conservation education and outreach techniques*. New York, NY: Oxford University Press.

Kals, E., and Ittner, H. (2003). Children's environmental identity: Indicators and behavioral impacts. In S. Clayton and S. Opotow (Eds.), *Identity and the natural environment: The psychological significance of nature* (pp. 135-157). Cambridge, MA: The MIT Press.

Kotler, P., and Roberto, E. L. (1989). *Social marketing: Strategies for changing public behavior*. New York, NY: The Free Press, a Division of Macmillan, Inc.

Mordock, K., and Krasny, M.E. (2001). Participatory action research: A theoretical and practical framework for EE. *The Journal of Environmental Education, 32*(3), 15-20.

Ramsey, J., Hungerford, H. R., and Tomera, A. N. (1981). The effects of environmental action and environmental case study instruction on the overt environmental behavior of eighth-grade students. *Journal of Environmental Education, 13*, 24-29.

Sia, A. P. (1985). Selected predictors of responsible environmental behavior: An analysis. *Journal of Environmental Education, 17*(2), 31-40.

Smith-Sebasto, N.J., and Fortner, R.W. (1994). The Environmental Action Internal Control Index. *Journal of Environmental Education, 25*(4), 23-29.

Smith-Sebasto, N.J. (1994). Designing a Likert-style scale to predict environmentally responsible behavior in undergraduate students: A multistep process. *Journal of Environmental Education, 39*(2), 4-14.

Stapp, W. B., Wals, A. E. J., and Stankorb, S. L. (1996). *Environmental education for empowerment: Action research and community problem solving*. Dubuque, IA: Kendall/Hunt Publishing Company.

Volk, T.L., and Cheak, M. (2003). The effects of an environmental education program on students, parents, and community. *The Journal of Environmental Education, 34*(4), 12-25.

Conservation Theory/Conservation Psychology

Brody, M. (2005). Learning in nature. *Environmental Education Research, 11*(5), 603-621.

Bunting, T.E., and Cousins, L.R. (1985). Environmental dispositions among school-age children: A preliminary investigation. *Environment and Behavior, 17*(6), 725-768.

Clayton, S., and Brook, A. (2005). Can psychology help save the world? A model for conservation psychology. *Analyses of Social Issues and Public Policy, 5*(1), 87-102.

Clayton, S., and Opotow, S. (Eds.). (2003). *Identity and the natural environment: The psychological significance of nature*. Cambridge, MA: The MIT Press.

Dietz, T., Fitzgerald, A., and Shwom, R. (2005). Environmental values. In P. A. Matson (Ed.), *Annual Review of Environment and Resources* (Vol. 30, pp. 335-372). Palo Alto, CA: Annual Reviews.

Gotch, C., and Hall, T. (2004). Understanding nature-related behaviors among children through a Theory of Reasoned Action approach. *Environmental Education Research, 10*(2), 157-177.

Hart, P., Barrett, M.J., Schnack, K., and others (2004). Reflections on the 7th invitational seminar on research and development in health and environmental education: Anchorage, Alaska, USA, October 2003. *Environmental Education Research, 10*(4), 2004.

Hungerford, H.R., and Volk, T.L. (1990). Changing learner behavior through environmental education. *The Journal of Environmental Education, 21*(3), 8-21.

Kahn, P.H., Jr., and Kellert, S.R. (2002). *Children and Nature: Psychological, sociocultural, and evolutionary investigations*. Cambridge, MA: The MIT Press.

Kals, E., and Ittner, H. (2003). Children's environmental identity: Indicators and behavioral impacts. In S. Clayton and S. Opotow (Eds.), *Identity and the natural environment: The psychological significance of nature* (pp. 135-157). Cambridge, MA: The MIT Press.

Kaplan, S. (2000). Human nature and environmentally responsible behavior. *Journal of Social Issues, 56*(3), 491-508.

Krasny, M.E., and Lee, S.-K. (2002). Social learning as an approach to environmental education: Lessons from a program focusing on non-indigenous, invasive species. *Environmental Education Research, 8*(2), 101-119.

Loughland, T., Reid, A., and Petocz, P. (2002). Young people's concepts of environment: A phenomenographic analysis. *Environmental Education Research, 8*(2), 187-197.

Loughland, T., Walker, K., and Petocz, P. (2003). Factors influencing young people's conceptions of environment. *Environmental Education Research, 9*(1), 3-20.

Marcinkowski, T.J. (2004). *Using a logic model to review and analyze an environmental education program*. Monograph No. 1. Washington, D.C.: North American Association for Environmental Education (NAAEE).

McKenzie-Mohr, D. (2000). Promoting sustainable behavior: An introduction to community-

based social marketing. *Journal of Social Issues, 56*(3), 543-554.

Monroe, M.C. (2003). Two avenues for encouraging conservation behaviors. *Human Ecology Review, 10*(2), 113-125.

Saunders, C. (2003). The emerging field of conservation psychology. *Human Ecology Review, 10*(2), 137-149.

Saunders, C., Brook, A.T., and Myers, O.E., Jr. (2006). Using psychology to save biodiversity and human well-being. *Conservation Biology, 20*(3), 702-705.

Saunders, C.D., and Myers, O.E., Jr. (Eds.). (2003). *Human Ecology Review Special Issue—Conservation Psychology*, 10(2).

Stern, P.C. (2000). Toward a coherent theory of environmentally significant behavior. *Journal of Social Issues, 56*(3), 407-424.

Stern, P.C., Dietz, T., Abel, T., and others (1999). A value-belief-norm theory of support for social movements: The case of environmentalism. *Human Ecology Review, 6*(2), 81-97.

Tanner, T. (1980). Significant life experiences: A new research area in environmental education. *The Journal of Environmental Education, 11*(4), 20-24.

Thomashow, M. (1995). *Ecological identity: Becoming a reflective environmentalist*. Cambridge, MA: The MIT Press.

Vaske, J.J.,and Kobrin, K.C. (2001). Place attachment and environmentally responsible behavior. *The Journal of Environmental Education, 32*(4), 16-21.

Vining, J. (2003). The connection to other animals and caring for nature. *Human Ecology Review, 10*(2), 87-99.

Zelezny, L.C., and Schultz, P.W. (2000). Promoting environmentalism. *Journal of Social Issues, 56*(3), 365-371.

Content Analysis

Novak, J. D. (1998). *Learning, creating, and using knowledge: Concept maps as facilitative tools in schools and corporations*. Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

Rejeski, D. W. (1982). Children look at nature: Environmental perception and education. *The Journal of Environmental Education, 13*(4), 27-40.

Weber, R.P. (1990). *Basic content analysis* (2nd ed.). Newbury Park, CA: Sage Publications.

Curriculum

Arvai, J.L., Campbell, V.E.A., Baird, A., and Rivers, L. (2004). Teaching students to make better decisions about the environment: Lessons from the decision sciences. *The Journal of Environmental Education, 36*(1), 33-44.

Bodzin, A., and Shive, L. (2004). Designing a watershed inquiry. *Applied Environmental Education and Communication, 3*, 249-258.

Chase, V.C., and Boone, W.J. (1999). An effective teacher institute for curriculum dissemination. *Curator, 42*(3), 198-215.

Cronin-Jones, L.L. (1991). Science teacher beliefs and their influence on curriculum implementation: Two case studies. *Research in Science Teaching, 28*(3), 235-250.

Garner, L.C., and Gallo, M.A. (2005). Field trips and their effect on student achievement and attitudes. *Journal of College Science Teaching, 34*(5), 14-17.

Gennaro, E.D. (1981). The effectiveness of using previsit instructional materials on learning for a museum field trip experience. *Journal of Research in Science Teaching, 18*(3), 275-279.

Gunderson, K. (2001). *An evaluative study of the K-8 "Wilderness and Land Ethic" curriculum*. Report. Minneapolis: University of Minnesota, Dept. of Recreation, Park and Leisure Studies.

Hungerford, H.R., Volk, T.L., Ramsey, J.M., and Bluhm, W.J. (1994). *A prototype environmental education curriculum for the middle school*. Paris: UNESCO-UNEP.

Mayer, V., and Fortner, R. (1988). Relative effectiveness of four modes of dissemination of curriculum materials. *The Journal of Environmental Education, 19*(1), 30.

Payne, P.G. (2006). Environmental education and curriculum theory. *The Journal of Environmental Education, 37*(2), 25-35.

SEER. (2000). *California student assessment project: The effects of environment-based education on student achievement.* A report available at www.seer.org/pages/csap.pdf. San Diego, CA: State Education and Environment Roundtable (SEER).

Willis, J.M., and Weiser, B. (2005). Technology and environmental education: An integrated curriculum. *Applied Environmental Education and Communication, 4*, 297-303.

Wilson, J.R., and Monroe, M.C. (2005). Biodiversity curriculum that supports education reform. *Applied Environmental Education and Communication, 4*, 125-138.

Decision Makers/Decision-Making

Arvai, J.L., Campbell, V.E.A., Baird, A., and Rivers, L. (2004). Teaching students to make better decisions about the environment: Lessons from the decision sciences. *The Journal of Environmental Education, 36*(1), 33-44.

Depoe, S.P., Delicath, J.W., and Elsenbeer, M.-F.A. (Eds.). (2004). *Communication and public participation in environmental decision making*. Albany, NY: State University of New York Press.

Dietz, T., Fitzgerald, A., and Shwom, R. (2005). Environmental values. In P. A. Matson (Ed.), *Annual review of environment and resources* (Vol. 30, pp. 335-372). Palo Alto, CA: Annual Reviews.

Eisenhauer, B.W., and Nicholson, B. (2005). Using stakeholder's views: A social science methodology for the inclusive design of environmental communications. *Applied Environmental Education and Communication, 4*, 19-30.

Jacobson, S.K., Gape, L., Sweeting, M., and Stein, T.V. (2005). Using a nominal group process to plan educational outreach for a Bahamas park. *Applied Environmental Education and Communication, 4*, 305-316.

Keller, E., and Berry, J. (2003). *The influentials: One American in ten tells the other nine how to vote, where to eat, and what to buy*. New York, NY: Free Press.

Krasny, M.E., and Lee, S.-K. (2002). Social learning as an approach to environmental education: Lessons from a program focusing on non-indigenous, invasive species. *Environmental Education Research, 8*(2), 101-119.

Matyas, B. (2001). Beyond studying the visitors: Addressing the needs of decision makers. *Visitor Studies Today!, IV*(2), 10-11.

Monroe, M. C. (1999). *What works: A guide to environmental education and communication projects for practitioners and donors*. Gabriola Island, B.C., Canada: New Society Publishers.

Rubin, F., Schloss, J., and Lambert, N. (2001). *Developing a strategy to deliver GIS training and regional coastal decision makers*. Report. Cooperative Institute for Coastal and Estuarine Environmental Technology (CICEET).

Schloss, J.A., Lambert, N., and Rubin, F.A. (2002, May 20-23). *GIS outreach and training approaches for decision makers and educators to ensure data to action in local watersheds.* Paper presented at the NWQMC National Monitoring Conference, Madison, WI. Available at http://www.nwqmc.org/NWQMC-Proceedings/Opening-Page.pdf.

Disabled/Physically Challenged

Devine, M.A. (2004). Being a 'doer' instead of a 'viewer': The role of inclusive leisure contexts in determining social acceptance for people with disabilities. *Journal of Leisure Research, 36*.

Jennings, H. (1997). Focus groups with zoo visitors who are blind or have low vision. In M. Wells and R. Loomis (Eds.), *Visitor studies: Theory, research and practice. Vol. 9. Selected papers from the 1996 Visitor Studies Conference* (pp. 171-175). Jacksonville, AL: Visitor Studies Association.

AAM. (1992). *The accessible museum: Model programs of accessibility for disabled and older people*. Washington, D.C.: American Association of Museums with funding from the National Endowment for the Arts and the Institute of Museum Services.

Discovery Rooms

Gottfried, J.L. (1979). *A naturalistic study of children's behavior in a free-choice learning environment.* Ph.D. Dissertation, University of California-Berkeley.

White, J. (1990). What have we discovered about discovery rooms? In B. Serrell (Ed.), *What research says about learning in science museums*. Washington, D.C.: Association of Science-Technology Centers (ASTC).

Diverse Groups/Minority Populations

Adeola, F.O. (1994). Environmental hazards, health, and racial inequity in hazardous waste distribution. *Environment and Behavior, 26*(1), 99-126.

Arp, W., III, and Kenny, C. (1996). Black environmentalism in the local community context. *Environment and Behavior, 28*(3), 267-282.

Barnett, M., Lord, C., Strauss, E., and others (2006). Using the urban environment to engage youths in urban ecology field studies. *The Journal of Environmental Education, 37*(2), 3-11.

Bechtel, R.B., Verdugo, V.C., and Pinheiro, J.D.Q. (1999). Environmental belief systems: United States, Brazil and Mexico. *Journal of Cross-Cultural Psychology, 30*(1), 122-128.

Bell, P., Bricker, L.A., Lee, T.R., and others (2006, April 3). *Understanding the cultural foundations of children's biological knowledge: Insights from everyday cognition research.* Paper presented at the National Association for Research in Science Teaching, San Francisco, CA. Available at http://life-slc.org/?p=109.

Caron, J. (1989). Environmental perspectives of Blacks: Acceptance of the new environmental paradigm. *Journal of Environmental Education, 20*(3), 21-26.

Caron-Sheppard, J. (1995). The black-white environmental concern gap: an examination of environmental paradigms. *Journal of Environmental Education, 26*(2), 24-35.

Daudi, S.S., and Heimlich, J.F. (1999). *Environmental justice in a changing world: A historical perspective*. EETAP Resource Library: Environmental Education and Training Partnership. Available at http://www.eelink.net.

Derr, V. (2001). *Growing up in the Hispano homeland: The interplay of nature, family, culture, and community in shaping children's experiences and sense of place.* Dissertation, Yale University.

Fisman, L. (2005). The effects of local learning on environmental awareness in children: An empirical investigation. *The Journal of Environmental Education, 36*(3), 39-50.

Hong, A., and Anderson, D.H. (2006). Barriers to participation for Latino people at Dodge Nature Center. *The Journal of Environmental Education, 37*(4), 33-44.

Hood, M. (1993). The African-American museum visitor: Who comes, who does not come, and why? *Visitor Behavior, 8*(2).

— (1996). A view from "outside": Research on community audiences. In S. Bitgood (Ed.), *Visitor studies: Theory, research, and practice. Vol. 7 #1. Selected papers from the 1994 Visitor Studies Conference* (pp. 77-87). Jacksonville, AL: Visitor Studies Association.

James, K. (1993). *A qualitative study of factors influencing racial diversity in environmental education.* Doctoral Dissertation, University of Minnesota.

Johnson, C.Y., Bowker, J.M., and Cordell, H.K. (2004). Ethnic variation in environmental belief and behavior: An examination of the New Ecological Paradigm in a social psychological context. *Environment and Behavior, 36*(2), 157-186.

Jones, M. G. (1996). Family science: A celebration of diversity. *Science and Children, 34*(2).

Kahn, P. H., Jr., and Friedman, B. (1995). Environmental views and values of children in an inner-city Black community. *Child Development, 63*, 416-430.

Kalof, L., Dietz, T., Guagnano, G., and Stern, P.C. (2002). Race, gender and environmentalism: The atypical values and beliefs of white men. *Race, Gender and Class, 9*(2), 1.

Kellert, S. (1985). Attitudes toward animals: Age-related development among children. *Journal of Environmental Education, 16*(3), 29-35.

Lehtonen, L. J. (1989). *Science learning experiences for Hispanic parents and children in an informal setting*. Unpublished thesis, The University of Houston-Clear Lake.

Lewis, S., and James, K. (1995). Whose voice sets the agenda for environmental education? Misconceptions inhibiting racial and cultural diversity. *Journal of Environmental Education, 26*(3), 5-12.

Madfes, T.J. (Ed.). (2004). *What's fair got to do with it: Diversity cases from environmental educators*. San Francisco, CA: West Ed, with EETAP and NAAEE.

Madison, A.-M. (1992). *Minority issues in program evaluation*. San Francisco, CA: Jossey-Bass Publishers.

Marin, G., and Marin, B. V. O. (1991). *Research with Hispanic populations*. Newbury Park, CA: Sage Publications.

Mayeno, A.S. (2000). *Environmental education needs and preferences of an inner city community of color.* Thesis, San Francisco State University, San Francisco. Available at http://www.goldengateaudubon.org/PDFs/East_Oak_Needs_Assess.pdf#search=%22Mayen o%20%22environmental%20education%22%22.

Morrone, M., and Meredith, J. (2003). Underserved audiences and environmental education in Ohio. *Applied Environmental Education and Communication, 2*, 203-211.

Nabhan, G. P. (1997). *Cultures of Habitat: On nature, culture and story*. Washington, D.C.: Counterpoint.

Noe, F. P., and Snow, R. (1989/90). Hispanic cultural influence on environmental concern. *Journal of Environmental Education, 21*(2), 27-34.

Parker, J. D., and McDonough, M. H. (1999). Environmentalism of African Americans: An analysis of the subculture and barriers theories. *Environment and Behavior*, *31*(2), 155-177.

Pena, D. G. (1998). *Chicano culture, ecology, politics: Subversive kin*. Tucson, AZ: The University of Arizona Press.

Rao, P., Arcury, T.A., and Quandt, S.A. (2004). Student participation in community-based participatory research to improve migrant and seasonal farmworker environmental health: Issues for success. *The Journal of Environmental Education, 35*(2), 3-15.

Roper Starch Worldwide. (1994). *Environmental attitudes and behaviors of American youth*. Washington, DC: National Environmental Education and Training Foundation (NEETF). Available at <eelink.net/ROPER/one.html>.

Running-Grass. (1994). Towards a multicultural environmental education. *Multicultural Education, 2*(1), 4-6.

Schultz, P.W. (2002). Environmental attitudes and behaviors across cultures. In W. J. Lonner, D. L. Dinnel, S. A. Hayes, and D. N. Sattler (Eds.), *Online readings in psychology and culture (Unit 8, Ch. 4)*. Bellingham, WA: Center for Cross-Cultural Research, Western Washington University. Available at http://www.wwu.edu/~culture.

Schultz, P.W., Unipan, J.B., and Gambra, R.J. (2000). Acculturation and ecological worldview among Latino Americans. *The Journal of Environmental Education, 31*(2), 22-27.

Taylor, D. E. (1989). Blacks and the environment: Toward an explanation of the concern and action gap between Blacks and Whites. *Environment and Behavior, 21*(2), 175-205.

Taylor, D.E. (1996). Making multicultural environmental education a reality. *Race, Poverty and Environment, 6*, 3-6.

Whittaker, M., Segura, G.M., and Bowler, S. (2003, April 3-6). *Racial/ethnic group attitudes towards environmental protection in California: Is "environmentalism" still a white phenomenon?* Paper presented at the Annual Meeting of the Midwest Political Science Association, Chicago, IL.

Wilhelm, S.A., and Schneider, I.E. (2005). Diverse urban youth's nature: Implications for environmental education. *Applied Environmental Education and Communication, 4*, 103-113.

Zbleski, B., Barrett, T., Lukosus, A., and others (1999). *Environmental justice and environmental education*. EETAP Resource Library: Environmental Education and Training Partnership. Available at http://www.eelink.net/eetap/info59.pdf.

Early Childhood Ed/Young Children

Browning, P. C., and Hatch, J. A. (1995). Qualitative research in early childhood settings: A review. In J. A. Hatch (Ed.), *Qualitative Research in Early Childhood Settings*. Westport, CT: Praeger Publishers.

Cohen, S., and Horm-Wingerd, D. (1993). Children and the environment: Ecological awareness among preschool children. *Environment and Behavior, 25*(1), 103-120.

Gestwicki, C. (1999). *Developmentally appropriate practice: Curriculum and development in early education* (2nd ed.). Albany, NY: Delmar Publishers.

Goodwin, W. L., and Goodwin, L. D. (1996). *Understanding quantitative and qualitative research in early childhood education*. New York, NY: Teachers College Press, Columbia University.

Hatch, J. A. (1995). *Qualitative research in early childhood settings*. Westport, CT: Praeger Publishers.

Hyun, E. (2005). How is young children's intellectual culture of perceiving nature different from adults'? *Environmental Education Research, 11*(2), 199-214.

Margadant-van Arcken, M. (1989). Environmental education, children and animals. *Anthrozoos, 3*(1), 14-19.

Massey, C. (1996). Listening to young children: Assessment and research techniques for very young visitors. In S. L. Jens (Ed.), *Visitor studies: Theory, research, and practice. Vol. 8 #1. Selected papers from the 1995 Visitor Studies Conference* (pp. 82-89). Jacksonville, AL: Visitor Studies Association.

Musser, L. M., and Diamond, K. E. (1999). The children's attitudes toward the environment scale for preschool children. *The Journal of Environmental Education, 30*(2), 23-30.

Nabhan, G. P. (1997). *Cultures of Habitat: On nature, culture and story*. Washington, D.C.: Counterpoint.

Nabhan, G.P., and Trimble, S. (1994). *The Geography of childhood: Why children need wild places*. Boston, MA: Beacon Press.

Poresky, R.H. (1990). The young children's empathy measure: Reliability, validity and effects of companion animal bonding. *Psychological Reports, 66*, 931-936.

Sebba, R. (1991). The landscapes of childhood: The reflection of childhood's environment in adult memories and in children's attitudes. *Environment and Behavior, 23*(4), 395-422.

Seefeldt, C. (Ed.). (1999). *The early childhood curriculum: Current findings in theory and practice*. (3rd ed.). New York: Teachers College Press.

Smith, L. (1996). Listening to young children: Successful techniques for interviewing 3-5 year olds. In S. L. Jens (Ed.), *Visitor studies: Theory, research, and practice. Vol. 8. Selected papers from the 1995 Visitor Studies Conference* (pp. 90-95). Jacksonville, AL: Visitor Studies Association.

Wilson, R. A. (1994). *Environmental education at the early childhood level*. Troy, OH: North American Association for Environmental Education.

Wilson, R.A. (1994). *Fostering a sense of wonder during the early childhood years*. Columbus, OH: Greyden Press.

Environmental Education

Aivazidis, C., Lazaridou, M., and Hellden, G.F. (2006). A comparison between a traditional and an online environmental educational program. *The Journal of Environmental Education, 37*(4), 45-54.

Armstrong, J. B., and Impara, J. C. (1991). The impact of an environmental education program on knowledge and attitude. *Journal of Environmental Education, 22*, 36-40.

Arvai, J.L., Campbell, V.E.A., Baird, A., and Rivers, L. (2004). Teaching students to make better decisions about the environment: Lessons from the decision sciences. *The Journal of Environmental Education, 36*(1), 33-44.

Asch, J., and Shore, B. M. (1975). Conservation behavior as the outcome of environmental education. *The Journal of Environmental Education, 6*(4), 25-33.

Backman, S.A., and Crompton, J.L. (1985). Education experiences contribute to cognitive development. *Journal of Environmental Education, 16*(2), 4-13.

Banks, D.L., Elser, M., and Saltz, C. (2005). Analysis of the K-12 component of the Central Arizona-Phoenix Long-Term Ecological Research (CAP LTER) project 1998 to 2002. *Environmental Education Research, 11*(5), 649-663.

Barnett, M., Lord, C., Strauss, E., and others (2006). Using the urban environment to engage youths in urban ecology field studies. *The Journal of Environmental Education, 37*(2), 3-11.

Bechtel, R.B., Verdugo, V.C., and Pinheiro, J.D.Q. (1999). Environmental belief systems: United States, Brazil and Mexico. *Journal of Cross-Cultural Psychology, 30*(1), 122-128.

Bell, P., Bricker, L.A., Lee, T.R., and others (2006, April 3). *Understanding the cultural foundations of children's biological knowledge: Insights from everyday cognition research.* Paper presented at the National Association for Research in Science Teaching, San Francisco, CA. Available at http://life-slc.org/?p=109.

Bennett, D. B. (1988/89). Four steps to evaluating environmental education learning experiences. *The Journal of Environmental Education, 20*(2), 14-21.

Bhatt, V., Pratt, J., and Herrick, C. (2005). Developing an age-appropriate Web portal for high school students seeking environmental information: Moving beyond the one-room school house. *Applied Environmental Education and Communication, 4*, 161-172.

Bishop, K., and Scott, W. (1998). Deconstructing action competence: Developing a case for a

more scientifically-attentive environmental education. *Public Understanding of Science, 7*, 225-236.

Bodzin, A., and Shive, L. (2004). Designing a watershed inquiry. *Applied Environmental Education and Communication, 3*, 249-258.

Bowler, P.A., Kaiser, F.G., and Hartig, T. (1999). A role for ecological restoration work in university environmental education. *The Journal of Environmental Education, 30*(4), 19-26.

Brody, M. (1996). An assessment of 4th-, 8th-, and 11th-grade students' environmental science knowledge related to Oregon's marine resources. *Journal of Environmental Education, 27*(3), 21.

Brody, M. (2005). Learning in nature. *Environmental Education Research, 11*(5), 603-621.

Bunting, T.E., and Cousins, L.R. (1985). Environmental dispositions among school-age children: A preliminary investigation. *Environment and Behavior, 17*(6), 725-768.

Clayton, S. (2003). Environmental identity: A conceptual and an operational definition. In S. Clayton and S. Opotow (Eds.), *Identity and the natural environment: The psychological significance of nature* (pp. 45-65). Cambridge, MA: The MIT Press.

Cleveland, M., Kalamas, M., and Laroche, M. (2005). Shades of green: Linking environmental locus of control and pro-environmental behaviors. *Journal of Consumer Marketing, 22*(4), 198-212.

Clover, D.E., Follen, S., and Hall, B. (2000). *The Nature of Transformation: Environmental adult education* (2nd ed.). Toronto: Ontario Institute for Studies in Education/University of Toronto.

Cronin-Jones, L.L. (2000). The effectiveness of schoolyards as sites for elementary science instruction. *School Science and Mathematics, 100*(4), 203-211.

Culen, G.R. (1994). *The effects of an extended case study on environmental behavior and associated variables in seventh and eighth grade students.* Paper presented at the North American Association for Environmental Education, Cancun, Mexico.

Davis, G.R. (2000). Standards-based education and its impact on environmental science education. *Electronic Journal of Science and Education, 4*(3).

DiEnno, C.M., and Hilton, S.C. (2005). High school students' knowledge, attitudes, and levels of enjoyment of an environmental education unit on nonnative plants. *The Journal of Environmental Education, 37*(1), 13-25.

Dietz, T., Fitzgerald, A., and Shwom, R. (2005). Environmental values. In P. A. Matson (Ed.), *Annual Review of Environment and Resources* (Vol. 30, pp. 335-372). Palo Alto, CA: Annual Reviews.

Dressner, M., and Gill, M. (1994). Environmental education at summer nature camp. *Journal of Environmental Education, 25*(3), 35-41.

Driskell, D. (2002). *Creating better cities with children and youth: A manual for participation*. London: UNESCO and Earthscan Publications Ltd.

Dwyer, W., Leeming, F. C., Cobern, M. K., Porter, B. E., and Jackson, J. M. (1993). Critical review of behavioral interventions to preserve the environment: Research since 1980. *Environment and Behavior*, *25*(3), 275-321.

Eisenhauer, B.W., and Nicholson, B. (2005). Using stakeholder's views: A social science methodology for the inclusive design of environmental communications. *Applied Environmental Education and Communication, 4*, 19-30.

Elder, J.L. (2003). *A field guide to environmental literacy: Making strategic investments in environmental education*. Rock Spring, GA: Environmental Education Coalition (available through NAAEE).

Ernst, J.A., and Monroe, M. (2004). The effects of environmental-based education on students' critical thinking skills and disposition toward critical thinking. *Environmental Education Research, 10*(4), 507-522.

Euler, E. (1989). A comparative study of the effectiveness of a local environmental center's program for urban sixth-graders' environmental knowledge and attitudes. *Children's Environments Quarterly, 6*(2/3), 34-41.

Fedler, A.J. (Ed.). (2001). *Defining best practices in boating, fishing, and stewardship education*. Gainesville, FL: Recreational Boating and Fishing Foundation. Available at www.rbff.org/educational/bpe1.pdf.

Fein, J., Scott, W., and Tilbury, D. (2001). Education and conservation: Lessons from an evaluation. *Environmental Education Research, 7*(4), 379-395.

Fien, J., and Rawling, R. (1996). Reflective practice: A case study of professional development for environmental education. *Journal of Environmental Education, 27*(3), 11-21.

Fisman, L. (2005). The effects of local learning on environmental awareness in children: An empirical investigation. *The Journal of Environmental Education, 36*(3), 39-50.

Garner, L.C., and Gallo, M.A. (2005). Field trips and their effect on student achievement and attitudes. *Journal of College Science Teaching, 34*(5), 14-17.

Glenn, J. L., and NAAEE (2000). *Environment-based education: Creating high performance schools and students*. Report. The National Environmental Education and Training Foundation (NEETF).

Gough, A. (2005). Sustainable schools: Renovating educational processes. *Applied Environmental Education and Communication, 4*, 339-351.

Hanna, G. (1995). Wilderness-related environmental outcomes of adventure and ecology education programming. *Journal of Environmental Education, 27*(1), 21-32.

Hart, P., Barrett, M.J., Schnack, K. and others (2004). Reflections on the 7th invitational seminar on research and development in health and environmental education: Anchorage, Alaska, USA, October 2003. *Environmental Education Research, 10*(4), 2004.

Hart, R.A.H. (1997). *Children's participation: The theory and practice of involving young citizens in community development and environmental care*. New York and London: UNICEF and Earthscan Publications Ltd.

Harvey, M.R. (1989/1990). The relationship between children's experiences with vegetation on school grounds and their environmental attitudes. *Journal of Environmental Education, 21*(2), 9-15.

Haury, D.L. (2000). *Studying watersheds: A Confluence of important ideas.* ERIC Digest No. 80 (ED463950) available from www.eric.ed.gov: ERIC.

Heimlich, J.E. (Ed.). (2005, July). *Environmental Education Research Special Issue: Free-choice learning and the environment*, 11(3).

Hewitt, P. (1997). Games in instruction leading to environmentally responsible behavior. *Journal of Environmental Education, 28*(3), 35-37.

Hungerford, H. R., and Volk, T. L. (1990). Changing learner behavior through environmental education. *The Journal of Environmental Education, 21*(3), 8-21.

Hungerford, H. R., Bluhm, W. J., Volk, T. L., and Ramsey, J. M. (1998). *Essential Readings in Environmental Education*. Champaign, IL: Stipes Publishing L.L.C.

Hungerford, H. R., Litherland, R. A., Peyton, R. B., Ramsey, J. M., and Volk, T. L. (1996). *Investigating and evaluating environmental issues and actions: Skill development program*. Champaign, IL: Stipes Publishing LLC.

Hungerford, H.R., Volk, T.L., Ramsey, J.M., and Bluhm, W.J. (1994). *A prototype environmental*

education curriculum for the middle school. Paris: UNESCO-UNEP.

Hyun, E. (2005). How is young children's intellectual culture of perceiving nature different from adults'? *Environmental Education Research, 11*(2), 199-214.

Iozzi, L. A. (1989). What research says to the educator. Part one: Environmental education and the affective domain. *Journal of Environmental Education, 20*(3), 6-13.

Iozzi, L.A. (1989). What research says to the educator. Part two: Environmental education and the affective domain. *The Journal of Environmental Education, 20*(4), 6-13.

Jacobson, S.K., McDuff, M.D., and Monroe, M.C. (2006). *Conservation Education and Outreach Techniques*. New York, NY: Oxford University Press.

Jurin, R.R., and Hutchinson, S. (2005). Worldviews in transition: Using ecological autobiographies to explore students' worldviews. *Environmental Education Research, 11*(5), 485-501.

Kahn, P.H., Jr. (1999). *The human relationship with nature: Development and culture*. Cambridge, MA: The MIT Press.

Kalof, L., Dietz, T., Guagnano, G., and Stern, P.C. (2002). Race, gender and environmentalism: The atypical values and beliefs of white men. *Race, Gender and Class, 9*(2), 1.

Kellert, S.R., and Wilson, E.O. (Eds.). (1993). *The Biophilia Hypothesis*. Washington, D.C.: Island Press.

Kidd, A.H., and Kidd, R.M. (1990). Social and environmental influences on children's attitudes toward pets. *Psychological Reports, 67*, 807-818.

Knapp, C.E. (1999). *In accord with nature: Helping students form an environmental ethic using outdoor experience and reflection*. Charleston, WV: Appalachia Educational Laboratory, Inc. operating the ERIC Clearinghouse on Rural Education and Small Schools.

Knapp, D., and Poff, R. (2001). A qualitative analysis of the immediate and short-term impact of an environmental interpretive program. *Environmental Education Research, 7*(1), 55-65.

Knapp, D. (2000). Memorable experiences of a science field trip. *School Science and Mathematics, 100*(2), 65-72.

Kohl, J. (2005). Putting environmental interpretation to work for conservation in a park setting: Conceptualizing principal conservation strategies. *Applied Environmental Education and Communication, 4*, 31-42.

Krasny, M.E., and Lee, S.-K. (2002). Social learning as an approach to environmental education: Lessons from a program focusing on non-indigenous, invasive species. *Environmental Education Research, 8*(2), 101-119.

Lasso de la Vega, E. (2004). *Awareness, knowledge, and attitude about environmental education: Responses from environmental specialists, high school instructors, students, and parents.* Dissertation, College of Education, University of Central Florida, Orlando, FL.

Leeming, F.C., Dwyer, W.O., and Bracken, B.A. (1995). Children's environmental attitude and knowledge scale: Construction and validation. *The Journal of Environmental Education, 26*(3), 22-31.

Lewis, G. E. (1981). A review of classroom methodologies for environmental education. *Journal of Environmental Education*, *13*(2), 12-15.

Lewis, S., and James, K. (1995). Whose voice sets the agenda for environmental education? Misconceptions inhibiting racial and cultural diversity. *Journal of Environmental Education, 26*(3), 5-12.

Lieberman, G.A., and Hoody, L.L. (1998). *Closing the achievement gap: Using the environment as an integrated context for learning*. San Diego, CA: State Education and Environment Roundtable.

Liu, S.-T., and Kaplan, M.S. (2006). An intergenerational approach for enriching children's

environmental attitudes and knowledge. *Applied Environmental Education and Communication, 5*, 9-20.

Manning, R.E., and Freimund, A. (2004). Use of visual research methods to measure standards of quality for parks and outdoor recreation. *Journal of Leisure Research, 36.*

Manoli, C.C., Johnson, B., and Dunlap, R. (2005, April 11). *Assessing children's views of the environment: Modifying the New Ecological Paradigm Scale for use with children.* Paper presented at the Annual meeting of the American Educational Research Association (AERA), Montreal, Quebec.

Matson, P., Clark, W.C., Gadgil, A., and others (Eds.). (2005). *Annual Review of Environment and Resources, 30*. Palo Alto, CA: Annual Reviews.

Mayer, F.S., and Frantz, C.M. (2004). The connectedness to nature scale: A measure of individuals' feeling in community with nature. *Journal of Environmental Psychology, 24*, 503-515.

McCrea, E.J., and deBettencourt, K., eds. (2000). *Environmental studies in the K-12 classroom: A teacher's view*: Survey Research Center-University of Maryland College Park, NAAEE, and Environmental Literacy Council.

McKenzie-Mohr, D., and Smith, W. (1999). *Fostering sustainable behavior: An introduction to community-based social marketing*. Gabriola Island, B.C., Canada: New Society Publishers.

Meinhold, J.L., and Malkus, A.J. (2005). Adolescent environmental behaviors: Can knowledge, attitudes and self-efficacy make a difference? *Environment and Behavior, 37*(4), 511-532.

Monroe, M. C. (1999). *What works: A guide to environmental education and communication projects for practitioners and donors*. Gabriola Island, B.C., Canada: New Society Publishers.

Moore, R.C., Goltsman, S.M., and Iacofano, D.S. (Eds.). (1992). *Play for all guidelines: Planning, design and management of outdoor play settings for all children*. Berkeley, CA: MIG Communications.

Mordock, K., and Krasny, M.E. (2001). Participatory action research: A theoretical and practical framework for EE. *The Journal of Environmental Education, 32*(3), 15-20.

Morrone, M., and Meredith, J. (2003). Underserved audiences and environmental education in Ohio. *Applied Environmental Education and Communication, 2*, 203-211.

Musser, L.M., and Malkus, A.J. (1994). The children's attitudes toward the environment scale. *Journal of Environmental Education, 25*(3), 22-26.

Myers, G. (1998). *Children and Animals: Social development and our connections to other species*. Boulder, CO: Westview Press.

NAAEE. (2004). *Nonformal Environmental Education Programs: Guidelines for success*. Washington, DC: North American Association for Environmental Education.

Nabhan, G.P., and Antoine, S.S. (1993). The loss of floral and faunal story: The extinction of experience. In S. R. Kellert and E. O. Wilson (Eds.), *The biophilia hypothesis*. Washington D.C.: Island Press.

Nabhan, G.P., and Trimble, S. (1994). *The geography of childhood: Why children need wild places*. Boston, MA: Beacon Press.

NEETF and Glenn, J.L. (2000). *Environment-based education: Creating high performance schools and students.* A report available at www.neetf.org. Washington, D.C.: The National Environmental Education and Training Foundation (NEETF).

Niedermeyer, F.C. (1992). A checklist for reviewing environmental education programs. *The Journal of Environmental Education, 23*(2), 46-50.

Palmberg, I.E., and Kuru, J. (2000). Outdoor activities as a basis for environmental responsibility. *Journal of Environmental Education, 31*(4), 32-36.

Payne, P.G. (2006). Environmental education and curriculum theory. *The Journal of Environmental Education, 37*(2), 25-35.

Pooley, J. A., and O'Connor, M. (2000). Environmental education and attitudes: Emotions and beliefs are what is needed. *Environment and Behavior*, *32*(5), 711-723.

Powers, A.L. (2004). An evaluation of four place-based education programs. *The Journal of Environmental Education, 35*(4), 17-32.

Ramey, L. (1999). *Using environmental science education curricula and experiences to enhance science teaching for all students: Creating an integrated, inclusive learning environment.* Paper presented at the meeting of The Association for the Education of Teachers in Science, Austin, TX.

Rejeski, D. W. (1982). Children look at nature: Environmental perception and education. *The Journal of Environmental Education, 13*(4), 27-40.

Rideout, B.E. (2005). The effect of a brief environmental problems module on endorsement of the New Ecological Paradigm in college students. *The Journal of Environmental Education, 37*(1), 3-11.

Rideout, B.E., Hushen, K., McGinty, D., and others (2005). Endorsement of the New Ecological Paradigm in systematic and e-mail samples of college students. *The Journal of Environmental Education, 36*(2), 15-23.

Riechard, D.E., and McGarrity, J. (1994). Early adolescents' perceptions of relative risk from ten societal and environmental hazards. *Journal of Environmental Education, 26*(1), 16-23.

Robertson, A. (1994). Toward constructivist research in environmental education. *Journal of Environmental Education*, *25*(2), 21-31.

Schultz, P.W. (2001). The structure of environmental concern: Concern for self, other people, and the biosphere. *Journal of Environmental Psychology, 21*, 327-339.

Schultz, P.W. (2002). Environmental attitudes and behaviors across cultures. In W. J. Lonner, D. L. Dinnel, S. A. Hayes, and D. N. Sattler (Eds.), *Online readings in psychology and culture (Unit 8, Ch. 4)*. Bellingham, WA: Center for Cross-Cultural Research, Western Washington University.

Schultz, P.W., Shriver, C., Tabanico, J.J., and Khazian, A.M. (2004). Implicit connections with nature. *Journal of Environmental Psychology, 24*, 31-42.

SEER. (2000). *California student assessment project: The effects of environment-based education on student achievement.* A report available at www.seer.org/pages/csap.pdf. San Diego, CA: State Education and Environment Roundtable (SEER).

Shepardson, D.P., and Harbor, J. (2004). ENVISION: The effectiveness of a dual-level professional development model for changing teacher practice. *Environmental Education Research, 10*(4), 471-492.

Shepardson, D.P. (2005). Student ideas: What is an environment? *The Journal of Environmental Education, 36*(4), 49-58.

Shepardson, D.P., Harbor, J., Cooper, B., and McDonald, J. (2002). The impact of a professional development program on teachers' understandings about watersheds, water quality, and stream monitoring. *The Journal of Environmental Education, 33*(3), 34-40.

Smith-Sebasto, N.J., and Walker, L.M. (2005). Toward a grounded theory for residential environmental education: A case study of the New Jersey School of Conservation. *The Journal of Environmental Education, 37*(1), 27-42.

Smith-Sebasto, N.J. (1994). Designing a Likert-style scale to predict environmentally responsible behavior in undergraduate students: A multistep process. *Journal of Environmental Education, 39*(2), 4-14.

Sobel, D. (1998). *Mapmaking with children: Sense of place education for the elementary years*. Portsmouth, NH: Heinemann.

Stapp, W. B., Wals, A. E. J., and Stankorb, S. L. (1996). *Environmental education for empowerment: Action research and community problem solving*. Dubuque, IA: Kendall/Hunt Publishing Company.

Stone, M.K. and Barlow, Z. (Eds.). (2005). *Ecological Literacy: Educating our children for a sustainable world*. San Francisco: Sierra Club Books.

Talsma, V. (2001). The Rouge education project: Challenges of implementation. *The Journal of Environmental Education, 32*(3), 26-30.

Taylor, D.E. (1996). Making multicultural environmental education a reality. *Race, Poverty and Environment, 6*, 3-6.

Teisl, M.F., and O'Brien, K. (2003). Who cares and who acts? Outdoor recreationists exhibit different levels of environmental concern and behavior. *Environment and Behavior, 35*(4), 506-522.

Thompson, S.C.G., and Barton, M.A. (1994). Ecocentric and anthropocentric attitudes toward the environment. *Journal of Environmental Psychology, 14*, 149-157.

Thurber, C.A., and Malinowski, J.C. (1999). Environmental correlates of negative emotions in children. *Environment and Behavior, 31*(4), 487-513.

Tourtillott, L., and Britt, P. (1994). *Evaluating environmental education materials*. Ann Arbor, MI: School of Natural Resources and Environment, University of Michigan.

Volk, T.L., and Cheak, M. (2003). The effects of an environmental education program on students, parents, and community. *The Journal of Environmental Education, 34*(4), 12-25.

Waage, F.O. (Ed.). (1985). *Teaching Environmental Literature*. New York: The Modern Language Association of America.

Whittaker, M., Segura, G.M., and Bowler, S. (2003, April 3-6). *Racial/ethnic group attitudes towards environmental protection in California: Is "environmentalism" still a white phenomenon?* Paper presented at the Annual Meeting of the Midwest Political Science Association, Chicago, IL.

Wilhelm, S.A., and Schneider, I.E. (2005). Diverse urban youth's nature: Implications for environmental education. *Applied Environmental Education and Communication, 4*, 103-113.

Willis, J.M., and Weiser, B. (2005). Technology and environmental education: An integrated curriculum. *Applied Environmental Education and Communication, 4*, 297-303.

Wilson, J.R., and Monroe, M.C. (2005). Biodiversity curriculum that supports education reform. *Applied Environmental Education and Communication, 4*, 125-138.

Wilson, R. A. (1994). *Environmental education at the early childhood level*. Troy, OH: North American Association for Environmental Education.

Wiltz, L.K. (2000). *Proceedings of the Teton Summit for Program Evaluation in Nonformal Environmental Education*. Kelly, Wyoming: Teton Science School and Ohio State University.

Winn, W., Stahr, F., Sarason, C., and others (2006). Learning oceanography from a computer simulation compared with direct experience at sea. *Journal of Research in Science Teaching, 43*(1), 25-42.

Woodhouse, J.L., and Knapp, C.E. (2000). *Place-based curriculum and instruction: Outdoor and environmental education approaches.* ERIC Digests Report (ED448012) available from www.eric.ed.gov.

Evaluation Methods

Allen, L., and Calhoun, E.F. (1998). Schoolwide action research: Findings from six years of study. *Phi Delta Kappan, 79*(9), 706-710.

Altrichter, H., Kemmis, S., McTaggart, R., and Zuber-Skerritt, O. (2002). The concept of action research. *The Learning Organization, 9*(3/4), 125-131.

BEEC. (2004, July 2004). *75 eval tools from Bay Area Environmental Education Evaluation Learning Community (BEEC)*. Retrieved November 2005, from http://www.peecworks.org/PEEC/PEEC_Inst/S006D6299.

Blossfeld, H.-P., Hamerle, A., and Mayer, K. U. (1989). *Event history analysis: Statistical theory and application in the social sciences*. Hillsdale, NJ: Lawrence Erlbaum Associates, Publishers.

Bringle, R.G., Phillips, M., and Hudson, M. (2004). *The measure of service learning: Research scales to assess student experiences*. Washington, DC: American Psychological Association.

Chambers, D.W. (1983). Stereotypic images of the scientist: The Draw-A-Scientist test. *Science Education, 67*(2), 255-265.

Checkoway, B., and Richards-Schuster, K. (2004). *Youth participation in evaluation and research as a way of lifting new voices*. Retrieved from http://www.colorado.edu/journals/cye/.

Chen, H.-T. (1990). *Theory-driven evaluation*. Newbury Park, CA: Sage Publications.

Coleman, G., Haas, B., and Himebauch, L. (2000). Interactive evaluation using the "learning tool." *Journal of Nutrition Education, 32*(6), 353-354.

Dierking, L., and Holland, D. (1996). Getting inside visitors' heads: Utilizing interpretive carts as a mechanism for analyzing visitor conversations. In S. Bitgood (Ed.), *Visitor studies: Theory, research, and practice. Vol. 7. #1. Selected papers from the 1994 Visitor Studies Conference* (pp. 19-25). Jacksonville, AL: Visitor Studies Association.

Dierking, L., and Pollock, W. (1998). *Questioning assumptions: An introduction to front-end studies in museums*. Washington, D.C.: Association of Science-Technology Centers (ASTC).

Doran, R.L. (1977). "State of the art" for measurement and evaluation of environmental objectives. *Journal of Environmental Education, 9*(1), 50-63.

Dunlap, R.E., Liere, K.D.V., Mertig, A.G., and Jones, R.E. (2000). Measuring endorsement of the New Ecological Paradigm: A revised NEP scale. *Journal of Social Issues, 56*(3), 425-442.

Ediger, M. (2003). Teacher involvement to evaluate achievement. *Education, 124*(1), 137-142.

Elder, G.H., Jr. (1998). The life course as developmental theory. *Child Development, 69*(1), 1-12.

Fetterman, D. M. (1998). *Ethnography: Step by step*. Thousand Oaks, CA: Sage Publications.

Fink, A., and Kosecoff, J. (1985). *How to conduct surveys: A step by step guide*. Newbury Park, CA: Sage Publications.

Firebaugh, G. (1997). *Analyzing repeated surveys*. Newbury Park, CA: Sage Publications.

Fitz-Gibbon, C.T., and Morris, L.L. (1987). *How to analyze data*. Newbury Park, CA: Sage Publications.

Fitz-Gibbon, C.T., and Morris, L.L. (1987). *How to design a program evaluation*. Newbury Park, CA: Sage Publications.

Goodwin, W. L., and Goodwin, L. D. (1996). *Understanding quantitative and qualitative research in early childhood education*. New York, NY: Teachers College Press, Columbia University.

Gough, S. (Ed.). (2004, Feb). *Environmental Education Research Special Issue: Case-Study Research in Environmental Education*, 10(1).

Greig, A., and Taylor, J. (1999). *Doing research with children*. Thousand Oaks, CA: Sage Publications.

Guskey, T.R. (2000). *Evaluating professional development*. Thousand Oaks, CA: Corwin Press, Inc.

Hammerman, E., and Musial, D. (1995). *Classroom 2061: Activity-based assessments in science*. Arlington Heights, IL: IRI/SkyLight Training and Publishing, Inc.

Hart, D. (1994). *Authentic assessment*. Menlo Park, CA: Addison-Wesley Publishing Company.

Hatch, J. A. (1995). *Qualitative research in early childhood settings*. Westport, CT: Praeger Publishers.

Hein, G. E. (1987). The right test for hands-on learning? *Science and Children*, October, 8-12.

Hein, G. E., and Price, S. (1994). *Active assessment for active science: A guide for elementary school teachers*. Portsmouth, NH: Heinemann.

Henerson, M.E., Morris, L.L., and Fitz-Gibbon, C.T. (1987). *How to measure attitudes*. Newbury Park, CA: Sage Publications.

Herman, J., Morris, L. L., and Fitz-Gibbon, C. T. (1987). *Evaluator's handbook*. Newbury Park, CA: Sage Publications.

Hess, B. (2000). Assessing program impact using latent growth modeling: A primer for the evaluator. *Evaluation and Program Planning, 23*, 419-428.

Hopkins, K. D. (1998). *Educational and psychological measurement and evaluation*. Boston, MA: Allyn and Bacon.

Jacobson, S.K., McDuff, M.D., and Monroe, M.C. (2006). *Conservation education and outreach techniques*. New York, NY: Oxford University Press.

Jochums, B. L., and Pershey, E. J. (1993). Using the vignette method in formative evaluation. *Evaluation Practice, 14*(2), 155-161.

Kalton, G. (1983). *Introduction to survey sampling*. Newbury Park, CA: Sage Publications.

King, J.A., Morris, L.L., and Fitz-Gibbon, C.T. (1987). *How to assess program implementation*. Newbury Park, CA: Sage Publications.

Kirkpatrick, D.L. (1994). *Evaluating training programs: The four levels.* San Francisco, CA: Berrett-Koehler.

Koch, M., and Sackman, M. (2004). Assessment in the palm of your hand. *Science and Children, 42*(1), 33.

Korn, R., and Sowd, L. (1990). *Visitor surveys: A user's manual*. Washington, D.C.: American Association of Museums.

Krueger, R. A. (1988). *Focus Groups: A practical guide for applied research*. Newbury Park, CA: Sage Publications.

Leeming, F.C., Dwyer, W.O., and Bracken, B.A. (1995). Children's environmental attitude and knowledge scale: Construction and validation. *The Journal of Environmental Education, 26*(3), 22-31.

Levin, H.M., and McEwan, P.J. (2001). *Cost-effectiveness analysis: Methods and applications.* Thousand Oaks, CA: Sage Publications.

Lincoln, Y. S., and Guba, E. G. (1995). *Naturalistic inquiry*. Beverly Hills, CA: Sage Publications, Inc.

Madison, A.-M. (Ed.). (1992). *Minority issues in program evaluation*. (Number 53, Spring ed.). San Francisco, CA: Jossey-Bass Publishers.

Mager, R. F. (1988). *Analyzing performance problems*. Belmont, CA: Lake Publishing.

— (1988). *Making instruction work*. Belmont, CA: Lake Publishing.

— (1988). *Measuring instructional results*. Belmont, CA: Lake Publishing.

Manfredo, J. (1984). The comparability of onsite and offsite measures of recreation needs. *Journal of Leisure Research, 16*(3), 245-249.

Manning, R.E., and Freimund, A. (2004). Use of visual research methods to measure standards of

quality for parks and outdoor recreation. *Journal of Leisure Research*, *36.*

Matkins, J.J., and Sterling, D.R. (2003). Designing assessments. *Science and Children, 40*(8), 34-37.

McDavid, J. (1998). *Linking program evaluation and performance measurement: Are there ways we can build and sustain performance measurement systems?* Victoria, BC: Performance Measurement Resource Team.

Miller, D. C. (1991). *Handbook of research design and social measurement*. Newbury Park, CA: Sage Publications.

Mohr, L.B. (1995). *Impact analysis for program evaluation* (2nd ed.). Thousand Oaks, CA: Sage Publications, Inc.

Monroe, M. C. (2001). Evaluation's friendly voice: The structured open-ended interview. *Applied Environmental Education and Communication, 2001*, 13-18.

Morris, L.L., Fitz-Gibbon, C.T., and Freeman, M.E. (1987). *How to communicate evaluation findings*. Newbury Park, CA: Sage Publications.

Morris, L.L., Fitz-Gibbon, C.T., and Lindheim, E. (1987). *How to measure performance and use tests*. Newbury Park, CA: Sage Publications.

Musser, L.M., and Malkus, A.J. (1994). The children's attitudes toward the environment scale. *Journal of Environmental Education, 25*(3), 22-26.

Novak, J. D. (1998). *Learning, creating, and using knowledge: Concept maps as facilitative tools in schools and corporations*. Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

Novak, J.D., and Gowin, D.B. (1984). *Learning how to learn*. Cambridge: Cambridge University Press.

Orion, N., Hofstein, A., Tamir, P., and Giddings, G. J. (1997). Development and validation of an instrument for assessing the learning environment of outdoor science activities. *Science Education, 81*(2), 161-171.

Owen, J.M., and Rogers, P.J. (1999). *Program evaluation: Forms and approaches* (international ed.). London: Sage Publications.

Parsons, C. (1993). Front-end evaluation: How do you choose the right questions? In D. Thompson and others (Eds.), *Visitor studies: Theory, research, and practice. Vol. 6. Collected papers from the 1993 Visitor Studies Conference* (pp. 66-71). Jacksonville, AL: Visitor Studies Association.

Patton, M. Q. (1997). *Utilization-focused evaluation*. Thousand Oaks, CA: Sage Publications.

Patton, M. W. (1990). *Qualitative evaluation methods*. Beverly Hills, CA: Sage Publications.

Pellegrino, J.W., Chudowsky, M., and Glaser, R. (Eds.). (2001). *Knowing what students know: The science and design of educational assessment*. Washington, D.C.: National Academy Press.

Plantz, M. C., Greenway, M. T., and Hendricks, M. (1999). Outcome measurement: Showing results in the nonprofit sector. http://national.unitedway.org/outcomes/ndpaper.htm

Popham, W. J. (1975). *Educational evaluation*. Englewood Cliffs, NJ: Prentice Hall.

Rejeski, D. W. (1982). Children look at nature: Environmental perception and education. *The Journal of Environmental Education, 13*(4), 27-40.

Robertson, A. (1994). Toward constructivist research in environmental education. *Journal of Environmental Education, 25*(2), 21-31.

Rossi, P. H., Freeman, H. E., and Lipsey, M. W. (1999). *Evaluation: A systematic approach*. London: Sage Publications.

Settlage, J. (2000). Views of science as represented in urban schoolchildren's photographs. *Electronic Journal of Science Education, 5*(2), 1-11.

Shadish, W. R., Cook, T. D., and Leviton, L. C. (1991). *Foundations of program evaluation: Theory and practice*. Thousand Oaks, CA: Sage Publications.

Shavelson, R.J., Lang, H., and Lewin, B. (1994). *On concept maps as potential "authentic" assessments in science*. CSE Technical Report 388. Los Angeles, CA: National Center for Research on Evaluation, Standards, and Student Testing (CRESST).

Smith, L. (1996). Listening to young children: Successful techniques for interviewing 3-5 year olds. In S. L. Jens (Ed.), *Visitor studies: Theory, research, and practice. Vol. 8. Selected papers from the 1995 Visitor Studies Conference* (pp. 90-95). Jacksonville, AL: Visitor Studies Association.

Smith, M. L., and Glass, G. V. (1987). *Research and evaluation in education and the social sciences*. Boston, MA: Allyn and Bacon.

Staten, M.E. (1998). *Action research study: A framework to help move teachers toward an inquiry-based science teaching approach*: Milwaukee Public Schools, WI.

Stecher, B.M., and Davis, W.A. (1987). *How to focus an evaluation* (5th ed.). Newbury Park, CA: Sage Publications.

Stewart, D. W., and Shamdasani, P. N. (1990). *Focus groups: Theory and practice*. Newbury Park, CA: Sage Publications.

Straits, W.J., and Wilke, R.R. (2002). Practical considerations for assessing inquiry-based instruction. *Journal of College Science Teaching, 31*(7), 432-435.

Valdez, P.S. (2001). Alternative assessment. *The Science Teacher, 68*(8), 41-43.

Weinbaum, A. (1996). *Participatory assessment in afterschool programs.* ERIC report (ED414361) available at www.eric.ed.gov.

Wells, M., and Butler, B. (2002). A visitor-centered evaluation hierarchy. *Visitor Studies Today!, V*(1), 5-11.

Wholey, J., Hatry, H. P., and Newcomer, K. E. (1994). *Handbook of practical program evaluation*. San Francisco, CA: Jossey-Bass Publishers.

Wiltz, L.K. (2000). *Proceedings of the Teton Summit for Program Evaluation in Nonformal Environmental Education*. Kelly, Wyoming: Teton Science School and Ohio State University.

Wolf, R. L. (1980). A naturalistic view of evaluation. *Museum News*, p. 39.

Wood, B.B. (2001). Stake's countenance model: Evaluating an environmental education professional development course. *The Journal of Environmental Education, 32*(2), 18-27.

Yin, R.K. (2003). *Applications of case study research* (2nd ed. Vol. 34). Thousand Oaks, CA: Sage Publications.

Yin, R.K. (2003). *Case study research: Design and methods* (3rd ed. Vol. 5). Thousand Oaks, CA: Sage Publications.

Exhibits and Exhibit Labels

Allen, S., and Gutwill, J. (2004). Designing with multiple interactives: Five common pitfalls. *Curator, 47*(2), 199-212.

Bitgood, S., and others (1988). Exhibit design and visitor behavior. *Environment and Behavior, 20*(4), 474-491.

Borun, M., and Adams, K. A. (1991). From hands on to minds on: Labelling interactive exhibits. In A. Benefield, S. Bitgood, and H. Shettel (Eds.), *Visitor studies: Theory, research, and practice. Vol. 4. Collected papers from the 1991 Visitor Studies Conference* (pp. 115-120). Jacksonville, AL: The Center for Social Design.

Borun, M., and Dritsas, J. (1997). Developing family-friendly exhibits. *Curator, 40*(3), 178-196.

Borun, M., Chambers, M., and Cleghorn, A. (1996). Families are learning in science museums. *Curator, 39*(2), 123-138.

Borun, M., Chambers, M., Dritsas, J., and Johnson, J. (1997). Enhancing family learning through exhibits. *Curator, 40*(4), 279-295.

Borun, M., Cleghorn, A., and Garfield, C. (1995). Family learning in museums: A bibliographic review. *Curator, 38*(4), 262-270.

Borun, M., Massey, C., and Lutter, T. (1993). Naive knowledge and the design of science museum exhibits. *Curator, 36*(3), 201-219.

Diamond, J. (1991). Prototyping interactive exhibits on rocks and minerals. *Curator, 34*(1), 5-17.

Doering, Z. D. (1992). Environmental impact. *Museum News*, March/April, pp. 50-52.

Falk, J.H., Scott, C., Dierking, L., and others (2004). Interactives and visitor learning. *Curator, 47*(2), 171-198.

Gutwill, J.P. (2006). Labels for open-ended exhibits: Using questions and suggestions to motivate physical activity. *Visitor Studies Today, 9*(1).

Henriksen, E. K. (1998). Environmental issues in the museum: Applying public perceptions in exhibition development. *Curator, 41*(2), 90-105.

Hirschi, K. D., and Screven, C. G. (1988). Effects of questions on visitor reading behavior. *ILVS Review: A Journal of Visitor Behavior, 1*(1), 50-61.

Leinhardt, G., Crowley, K., and Knutson, K. (2002). *Learning conversations in museums*. Mahwah, NJ: Lawrence Erlbaum Associates, Publishers.

McManus, P. (1989). Oh, yes, they do: How museum visitors read and interact with exhibit texts. *Curator, 32*(3), 174-189.

McManus, P. (1990). Watch your language! People do read labels. In B. Serrell (Ed.), *What Research says about learning in science museums*. Washington, D.C.: Association of Science-Technology Centers (ASTC).

Morrissey, K., and Berge, Z. (1992). Exploring the relationship between media and learning: Lessons from the field of educational technology. In A. Benefield, S. Bitgood, and H. Shettel (Eds.), *Visitor studies: Theory, research, and practice. Vol. 4. Collected papers from the 1991 Visitor Studies Conference* (pp. 178-183). Jacksonville, AL: The Center for Social Design.

Perry, D. (1993). Designing exhibits that motivate. In P. McNamara, M. Borun, S. Grinell, and B. Serrell (Eds.), *What research says about learning in science museums* (Vol. 2, pp. 25-29). Washington, D.C.: Association of Science-Technology Centers (ASTC).

Roschelle, J. (1995). Learning in interactive environments: Prior knowledge and new experience. In J. Falk and L. Dierking (Eds.), *Public institutions for personal learning: Establishing a research agenda*. Washington, D.C.: American Association of Museums Technical Information Service.

Screven, C. G. (1990). Uses of evaluation before, during, and after exhibit design. *ILVS: A Journal of Visitor Behavior*, *1*(2), 36-66.

Serrell, B. (1990). *What research says about learning in science museums*. Washington, D.C.: Association of Science-Technology Centers (ASTC).

— (1996). *Exhibit labels: An interpretive approach*. Walnut Creek, CA: AltaMira Press.

— (1998). *Paying attention: Visitors and museum exhibitions*. Washington, D. C.: American Association of Museums.

Families

Ballantyne, R., Fien, J. and Packer, J. (2001). Program effectiveness in facilitating

intergenerational influence in environmental education: Lessons from the field. *The Journal of Environmental Education, 32*(4), 8-15.

Borun, M., and Dritsas, J. (1997). Developing family-friendly exhibits. *Curator, 40*(3), 178-196.

Borun, M., and others (1998). *Family learning in museums: The PISEC perspective*. Philadelphia, PA: Philadelphia/Camden Informal Science Education Collaborative (PISEC), The Franklin Institute.

Borun, M., Chambers, M., and Cleghorn, A. (1996). Families are learning in science museums. *Curator, 39*(2), 123-138.

Borun, M., Chambers, M., Dritsas, J., and Johnson, J. (1997). Enhancing family learning through exhibits. *Curator, 40*(4), 279-295.

Borun, M., Cleghorn, A., and Garfield, C. (1995). Family learning in museums: A bibliographic review. *Curator, 38*(4), 262-270.

Crowley, K. (2000). Parent explanations during museum visits: Gender differences in how children hear informal science. *Visitor Studies Today!, III*(3), 21-28.

Crowley, K., and Callanan, M. (1998). Describing and supporting collaborative scientific thinking in parent-child interactions. *Journal of Museum Education, 23*(1), 12-17.

Diamond, J. (1986). The behavior of family groups in science museums. *Curator, 29*(2), 139-154.

Gennaro, E., and Heller, P. (1983). Parent and child learning: A model for programs at informal science centers. *Journal of Museum of Education, 8*(2, Winter).

Griffin, J. (2004). Research on students and museums: Looking more closely at the students in school groups. *Science Education, 88*(Suppl. 1), S59-S70.

Hilke, D. D. (1988). Strategies for family learning in museums. In S. Bitgood, J. Roper, Jr., and A. Benefield (Eds.), *Visitor studies 1988: Theory, research, and practice. Proceedings of the First Annual Visitor Studies Conference* (pp. 120-125). Jacksonville, AL: The Center for Social Design.

Jones, M. G. (1996). Family science: A celebration of diversity. *Science and Children, 34*(2).

Lehtonen, L. J. (1989). *Science Learning Experiences for Hispanic Parents and Children in an Informal Setting*. Unpublished thesis, The University of Houston-Clear Lake.

Leinhardt, G., Crowley, K., and Knutson, K. (2002). *Learning Conversations in Museums*. Mahwah, NJ: Lawrence Erlbaum Associates, Publishers.

Parsons, C., and Muhs, K. (1996). Field trips and parent chaperones. In S. Bitgood (Ed.), *Visitor studies: Theory, research, and practice. Vol.7 #1. Selected papers from the 1994 Visitor Studies Conference* (pp. 57-61). Jacksonville, AL: Visitor Studies Association.

Vaughan, C., Gack, J., Solorazano, H., and Ray, R. (2003). The effect of environmental education on schoolchildren, their parents, and community members: A study of intergenerational and intercommunity learning. *The Journal of Environmental Education, 34*(3), 12-21.

Volk, T.L., and Cheak, M. (2003). The effects of an environmental education program on students, parents, and community. *The Journal of Environmental Education, 34*(4), 12-25.

Field Trips

Anderson, D., Kisiel, J., and Storksdieck, M. (2006). Understanding teachers' perspectives on field trips: Discovering common ground in three countries. *Curator, 49*(3), 365-386.

Anderson, D., and Lucas, K.B. (1997). The effectiveness of orienting students to the physical features of a science museum prior to visitation. *Research in Science Education, 27*(4), 485-495.

Balling, J., and Falk, J. (1980). A perspective on field trips: Environmental effects on learning. *Curator, 23*(4), 229-240.

Bitgood, S. (1989). Bibliography: School field trips to museums/zoos. *Visitor Behavior, IV*(2), 11-13.

Bitgood, S. (1993). What Do We Know About School Field Trips? In P. McNamara, M. Borun, S. Grinell, and B. Serrell (Eds.), *What research says about learning in science museums* (pp. 12-16). Washington, D.C.: Association of Science-Technology Centers (ASTC).

Bixler, R. D., Carlisle, C. L., Hammitt, W. E., and Floyd, M. F. (1994). Observed fears and discomforts among urban students on field trips to wildlands areas. *The Journal of Environmental Education, 26*(1), 24-33.

Falk, J. H., and Balling, J. D. (1980). The school field trip: Where you go makes the difference. *Science and Children*, pp. 6-9.

Falk, J. H., Martin, W. W., and Balling, J. D. (1978). The novel field-trip phenomenon: Adjustment to novel settings interferes with task learning. *Journal of Research in Science Teaching, 15*(2), 127-134.

Falk, J., and Balling, J. (1993). The field trip milieu: Learning and behavior as a function of contextual events. *Visitor Behavior, 8*(1).

Falk, J., and Dierking, L. (1997). School field trips: Assessing their long-term impact. *Curator, 40*(3), 211-218.

Fry, H. (1987). Worksheets as museum learning devices. *Museums Journal, 86*(4), 219-225.

Garner, L.C., and Gallo, M.A. (2005). Field trips and their effect on student achievement and attitudes. *Journal of College Science Teaching, 34*(5), 14-17.

Gennaro, E. D. (1981). The effectiveness of using previsit instructional materials on learning for a museum field trip experience. *Journal of Research in Science Teaching, 18*(3), 275-279.

Gennaro, E., Stoneberg, S.A., and Tanck, S. (1984). Chance or prepared mind? In S. Nichols (Ed.), *Museum education anthology, 1973-1983* (pp. 201-205). Washington, DC: Museum Education Roundtable.

Gilbert, J., and Priest, M. (1997). Models and discourse: A primary school science class visit to a museum. *Science Education (Special Issue: Informal Science Education), 81*(6), 749-762.

Gottfried, J. (1980). Do children learn on school field trips? *Curator, 23*(3), 165-174.

Griffin, J. (2004). Research on students and museums: Looking more closely at the students in school groups. *Science Education, 88*(Suppl. 1), S59-S70.

Griffin, J., and Symington, D. (1997). Moving from task-oriented to learning-oriented strategies on school excursions to museums. *Science Education (Special Issue: Informal Science Education), 81*(6), 763-779.

Hoke, M. (1991). Field-trip Tips: A baker's dozen. *Science and Children, 28*(7), 20-21.

Jelinek, D.J. (1998, April). *Student perceptions of the nature of science and attitudes towards science education in an experiential science program.* Paper presented at the 1998 NARST Annual Meeting, San Diego, CA. Available from ERIC (ED418875) www.eric.ed.gov.

Knapp, D., and Poff, R. (2001). A qualitative analysis of the immediate and short-term impact of an environmental interpretive program. *Environmental Education Research, 7*(1), 55-65.

Knapp, D. (2000). Memorable experiences of a science field trip. *School Science and Mathematics, 100*(2), 65-72.

Koran, J. J., Koran, M. L., and Ellis, J. (1989). Evaluating the effectiveness of field experiences: 1939-1989. *Visitor Behavior, IV*(2), 7-13.

Kubota, C. A., and Olstad, R. G. (1991). Effects of novelty-reducing preparation on exploratory behavior and cognitive learning in a science museum setting. *Journal of Research in Science Teaching 28*(3), 225-234.

Landis, C. (1996). *Teaching science in the field.* ERIC Digest (ED402154) available from www.eric.ed.gov.

Lessow, B. (1990). *Factors related to elementary teachers' effective utilization of field trips to informal science resources.* Dissertation, Indiana University.

Lisowski, M., and Disinger, J.F. (1987). *Cognitive learning in the environment: Secondary students.* ERIC Digest No. 1 (ED286756) available from www.eric.ed.gov.

Martin, W. W., Falk, J., and Balling, J. (1981). Environmental effects on learning: The outdoor field trip. *Science Education, 65*(3), 301-309.

McManus, P.M. (1985). Worksheet-induced behaviour in the British Museum (Natural History). *Journal of Biological Education, 19*(3), 237-242.

Midgett, B. (1979). Tight-ship Trips. *Teacher, 97*(1), 90-94.

Orion, N., Hofstein, A., Tamir, P., and Giddings, G.J. (1997). Development and validation of an instrument for assessing the learning environment of outdoor science activities. *Science Education, 81*(2), 161-171.

Parsons, C. (1999). Do self-guided groups learn anything?, *In AZA Annual Conference Proceedings*. Wheeling, WV: Association of Zoos and Aquariums.

Parsons, C., and Breise, A. (2000). Orientation for self-guided school groups on field trips. *Visitor Studies Today!, III*(2), 7-10.

Parsons, C., and Muhs, K. (1996). Field trips and parent chaperones. In S. Bitgood (Ed.), *Visitor studies: Theory, research, and practice. Vol.7 #1. Selected papers from the 1994 Visitor Studies Conference* (pp. 57-61). Jacksonville, AL: Visitor Studies Association.

Price, S., and Hein, G.E. (1991). More than a field trip: Science programmes for elementary school groups at museums. *International Journal of Science Education, 13*(5), 505-519.

Stronck, D. R. (1983). The comparative effects of different museum tours on children's attitudes and learning. *Journal of Research in Science Teaching, 20*(4), 283-290.

Tisdal, C. (1996). Using group interviews to target a school visit program: A case study. In S. Bitgood (Ed.), *Visitor studies: Theory, research, and practice. Vol. 7 #1. Selected papers from the 1994 Visitor Studies Conference* (pp. 99-109). Jacksonville, AL: Visitor Studies Association.

Focus Groups

Jennings, H. (1997). Focus groups with zoo visitors who are blind or have low vision. In M. Wells and R. Loomis (Eds.), *Visitor studies: Theory, research and practice. Vol. 9. Selected papers from the 1996 Visitor Studies Conference* (pp. 171-175). Jacksonville, AL: Visitor Studies Association.

Krueger, R. A. (1988). *Focus Groups: A practical guide for applied research*. Newbury Park, CA: Sage Publications.

Rubenstein, R. (1990). Focus groups and front-end evaluation. In S. Bitgood, A. Benefield, and D. Patterson (Eds.), *Visitor studies: Theory, research, and practice. Vol. 3. Proceedings of the 1990 Visitor Studies Conference* (pp. 87-93). Jacksonville, AL: Center for Social Design.

Stewart, D. W., and Shamdasani, P. N. (1990). *Focus groups: Theory and practice*. Newbury Park, CA: Sage Publications.

Tisdal, C. (1996). Using group interviews to target a school visit program: A case study. In S. Bitgood (Ed.), *Visitor studies: Theory, research, and practice. Vol. 7 #1. Selected papers from*

the 1994 Visitor Studies Conference (pp. 99-109). Jacksonville, AL: Visitor Studies Association.

Formative Evaluation

Diamond, J. (1991). Prototyping interactive exhibits on rocks and minerals. *Curator, 34*(1), 5-17.

Jochums, B. L., and Pershey, E. J. (1993). Using the vignette method in formative evaluation. *Evaluation Practice, 14*(2), 155-161.

McNamara, P. A. (1990). Trying it out. In B. Serrell (Ed.), *What research says about learning in science museums* (pp. 13-15). Washington, D.C.: Association of Science-Technology Centers (ASTC).

Screven, C. G. (1990). Uses of evaluation before, during, and after exhibit design. *ILVS: A Journal of Visitor Behavior, 1*(2), 36-66.

Wells, M., and Butler, B. (2002). A visitor-centered evaluation hierarchy. *Visitor Studies Today!, V*(1), 5-11.

Front-End Evaluation

Batsche, C., Hernandez, M., and Montenegro, M.C. (1999). Community needs assessment with Hispanic, Spanish-monolingual residents. *Evaluation and Program Planning, 22*, 13-20.

Dierking, L., and Pollock, W. (1998). *Questioning Assumptions: An introduction to front-end studies in museums*. Washington, D.C.: Association of Science-Technology Centers (ASTC).

Henriksen, E. K. (1998). Environmental issues in the museum: Applying public perceptions in exhibition development. *Curator, 41*(2), 90-105.

Parsons, C. (1993). Front-end evaluation: How do you choose the right questions? In D. Thompson and others (Eds.), *Visitor studies: Theory, research, and practice. Vol. 6. Collected papers from the 1993 Visitor Studies Conference* (pp. 66-71). Jacksonville, AL: Visitor Studies Association.

Rossett, A. (1987). *Training needs assessment*. Englewood Cliffs, NJ: Educational Technology Publications.

Rubenstein, R. (1990). Focus groups and front-end evaluation. In S. Bitgood, A. Benefield, and D. Patterson (Eds.), *Visitor studies: Theory, research, and practice. Vol. 3. Proceedings of the 1990 Visitor Studies Conference* (pp. 87-93). Jacksonville, AL: Center for Social Design.

Screven, C. G. (1990). Uses of evaluation before, during, and after exhibit design. *ILVS: A Journal of Visitor Behavior, 1*(2), 36-66.

Shettel, H. (1992). Front-end evaluation: Another useful tool. *ILVS Review: A Journal of Visitor Behavior, 2*(2), 275-280.

Wells, M., and Butler, B. (2002). A visitor-centered evaluation hierarchy. *Visitor Studies Today!, V*(1), 5-11.

Implementation Evaluation

Gamse, B., Millsap, M.A., and Goodson, B. (2002). When implementation threatens impact: Challenging lessons from evaluating educational programs. *Peabody Journal of Education, 77*(4), 146-166.

King, J.A., Morris, L.L., and Fitz-Gibbon, C.T. (1987). *How to assess program implementation*. Newbury Park, CA: Sage Publications.

Mayer, V.J., and Fortner, R.W. (1987). *Ohio Sea Grant Education Program: Development implementation evaluation*. Columbus, Ohio: Ohio Sea Grant Program.

Northwest Regional Educational Laboratory. (2001). *Implementation evaluation*. Retrieved
    January 28, 2005, from http://www.nwrac.org/whole-school/implement_a.html.

Intentions

Bowler, P.A., Kaiser, F.G., and Hartig, T. (1999). A role for ecological restoration work in
    university environmental education. *The Journal of Environmental Education, 30*(4), 19-26.
Cordano, M., Welcomer, S.A., and Scherer, R.F. (2003). An analysis of the predictive validity of
    the New Ecological Paradigm Scale. *The Journal of Environmental Education, 34*(3), 22-28.
Hungerford, H.R., and Volk, T.L. (1990). Changing learner behavior through environmental
    education. *The Journal of Environmental Education, 21*(3), 8-21.
Gotch, C., and Hall, T. (2004). Understanding nature-related behaviors among children through a
    Theory of Reasoned Action approach. *Environmental Education Research, 10*(2), 157-177.
Hanna, G. (1995). Wilderness-related environmental outcomes of adventure and ecology
    education programming. *Journal of Environmental Education, 27*(1), 21-32.

Interpretive Arts

Dierking, L., and Holland, D. (1996). Getting inside visitors' heads: Utilizing interpretive carts as a
    mechanism for analyzing visitor conversations. In S. Bitgood (Ed.), *Visitor studies: Theory,
    research, and practice. Vol. 7. #1. Selected papers from the 1994 Visitor Studies Conference*
    (pp. 19-25). Jacksonville, AL: Visitor Studies Association.
Garibay, C., and Perry, D. (1999). Summative evaluation for the Interpretive Stations Program at
    the Field Museum in *Current Trends in Audience Research, Vol. 12*. Washington, D.C.: AAM's
    Committee on Audience Research and Evaluation (CARE).

Interviews

Borun, M., Chambers, M., and Cleghorn, A. (1996). Families are learning in science museums.
    Curator, 39(2), 123-138.
Engel, S. (1999). *The stories children tell: Making sense of the narratives of childhood*. New York:
    W.H. Freeman and Company.
Gallas, K. (1995). *Talking their way into science: Hearing children's questions and theories,
    responding with curricula*. New York, NY: Teachers College Press, Columbia University.
Have, P.T. (1999). *Doing conversation analysis: A practical guide*. London: Sage Publications.
Leinhardt, G., Crowley, K., and Knutson, K. (Eds.). (2002). *Learning conversations in museums*.
    Mahwah, NJ: Lawrence Erlbaum Associates, Publishers.
Monroe, M.C. (2001). Evaluation's friendly voice: The structured open-ended interview. *Applied
    Environmental Education and Communication, 2001*, 13-18.
Psathas, G. (1995). *Conversation analysis: The study of talk-in-interaction*. Thousand Oaks, CA:
    Sage Publications.

Life Experience/Event History Analysis

Blossfeld, H.-P., Hamerle, A., and Mayer, K. U. (1989). *Event history analysis: Statistical theory
    and application in the social sciences*. Hillsdale, NJ: Lawrence Erlbaum Associates, Publishers.
Chawla, L. (1998). Significant life experiences revisited: A review of research on sources of
    environmental sensitivity. *Environmental Education Research, 4*(4), 369-382.
Chawla, L. (1998). Research methods to investigate significant life experiences: Review and
    recommendations. *Environmental Education Research, 4*(4), 383-397.

Tanner, T. (1980). Significant life experiences: A new research area in environmental education. *The Journal of Environmental Education, 11*(4), 20-24.

Tanner, T. (1998). Choosing the right subjects in significant life experiences research. *Environmental Education Research, 4*(4), 399-417.

Literature Review/Meta-Analysis

Barnes, B. R., and Clawson, E. U. (1975). Do advance organizers facilitate learning? Recommendations for further research based on an analysis of 32 studies. *Review of Educational Research, 45*(4), 637-659.

Bitgood, S. (1993). What do we know about school field trips? In P. McNamara, M. Borun, S. Grinell and B. Serrell (Eds.), *What research says about learning in science museums* (pp. 12-16). Washington, D.C.: Association of Science-Technology Centers (ASTC).

Borun, M., Cleghorn, A., and Garfield, C. (1995). Family learning in museums: A bibliographic review. *Curator, 38*(4), 262-270.

Chawla, L. (1998). Significant life experiences revisited: A review of research on sources of environmental sensitivity. *Environmental Education Research, 4*(4), 369-382.

Dwyer, W., Leeming, F. C., Cobern, M. K., Porter, B. E., and Jackson, J. M. (1993). Critical review of behavioral interventions to preserve the environment: Research since 1980. *Environment and Behavior, 25*(3), 275-321.

Hines, J. M., Hungerford, H. R., and Tomera, A. N. (1987). Analysis and synthesis of research on responsible environmental behavior: A meta-analysis. *Journal of Environmental Education 18*, 1-8.

Hoody, L. (1995). *The educational efficacy of environmental education: An interim report*. San Diego, CA: State Education and Environment Roundtable.

Hungerford, H. R., Bluhm, W. J., Volk, T. L., and Ramsey, J. M. (1998). *Essential Readings in Environmental Education*. Champaign, IL: Stipes Publishing L.L.C.

Hwang, Y.-H., Kim, S.-I., and Jeng, J.-M. (2000). Examining the causal relationships among selected antecedents of responsible environmental behavior. *The Journal of Environmental Education, 31*(4), 19-25.

Leeming, F. C., Dwyer, W. O., Porter, B. E., and Cobern, M. K. (1993). Outcome research in environmental education: A critical review. *The Journal of Environmental Education 24*(4), 8-21.

Marcinkowski, T. (2004). *An overview of an issue and action instruction program for stewardship education*. Retrieved January 2005 from http://208.59.58.124/educational/BPE8.pdf.

Monroe, M.C. (2003). Two avenues for encouraging conservation behaviors. *Human Ecology Review, 10*(2), 113-125.

Schultz, P.W., and Zelezny, L. (2003). Reframing environmental messages to be congruent with American values. *Human Ecology Review, 10*(2).

Screven, C. G. (1999). *Visitor studies bibliography and abstracts*. Chicago, IL: Screven and Associates.

Tanner, T. (1998). Choosing the right subjects in significant life experiences research. *Environmental Education Research, 4*(4), 399-417.

Wells, M., and Butler, B. (2002). A visitor-centered evaluation hierarchy. *Visitor Studies Today!, V*(1), 5-11.

Yerkes, R., and Haras, K. (1997). *Outdoor Education and Environmental Responsibility*. ERIC Digest Report. ERIC Clearinghouse on Rural Education and Small Schools.

Zelezny, L.C. (1999). Educational interventions that improve environmental behaviors: A meta-analysis. *The Journal of Environmental Education, 31*(1), 5.

Zelezny, L.C., Chua, P.-P., and Aldrich, C. (2000). Elaborating on gender differences in environmentalism. *Journal of Social Issues, 56*(3), 443-457.

Zimmermann, L. K. (1996). Knowledge, affect, and the environment: 15 years of research (1979-1993). *The Journal of Environmental Education, 27*(3), 41-44.

Logic Models

Bennet, C., and Rockwell, K. Introduction to TOPS. //citnews.unl.edu/TOP/english/introtop.html website accessed November 2004.

Bennett, C., and Rockwell, K. (1995). *Targeting outcomes of programs (TOP): An integrated approach to planning and evaluation.* Unpublished manuscript. Lincoln, NE: University of Nebraska.

Marcinkowski, T. (2004). *An overview of an issue and action instruction program for stewardship education*. Retrieved January 2005 from http://208.59.58.124/educational/BPE8.pdf.

Marcinkowski, T.J. (2004). *Using a logic model to review and analyze an environmental education program*. Monograph No. 1. Washington, D.C.: North American Association for Environmental Education (NAAEE).

University of Wisconsin. Logic Model Tutorial. Website accessed November 2004 at www.uwex.edu/ces/lmcourse/.

W.K. Kellogg Foundation. (2001). *Logic model development guide*. Available at www.wkkf.org/Programming/ResourceOverview.aspx?CID=281andID=3669.   Battle   Creek, MI: W.K. Kellogg Foundation.

Media

Crane, V., and others (1994). *Informal science learning: What the research says about television, science museums, and community-based projects*. Dedham, MA: Research Communications Ltd.

Hilke, D. D., Hemmings, E. C., and Springuel, M. (1988). The impact of interactive computer software on visitors' experiences: A case study. *ILVS Review: A Journal of Visitor Behavior, 1*(1), 34-49.

Levi, D., and Kocher, S. (1999). Virtual nature: The future effects of information technology on our relationship to nature. *Environment and Behavior, 31*(2), 203-226.

Morrissey, K., and Berge, Z. (1992). Exploring the relationship between media and learning: Lessons from the field of educational technology. In A. Benefield, S. Bitgood, and H. Shettel (Eds.), *Visitor studies: Theory, research, and practice. Vol. 4. Collected papers from the 1991 Visitor Studies Conference* (pp. 178-183). Jacksonville, AL: The Center for Social Design.

Roschelle, J. (1995). Learning in interactive environments: Prior knowledge and new experience. In J. Falk and L. Dierking (Eds.), *Public institutions for personal learning: Establishing a research agenda*. Washington, D.C.: American Association of Museums Technical Information Service.

Whitney, P. (1990). The electronic muse: Matching information and media to audiences. *ILVS Review: A Journal of Visitor Behavior, 1*(2), 68-77.

Naturalistic Inquiry

Elstgeest, J. (1985). The right question at the right time. In W. Harlen (Ed.), *Primary science: Taking the plunge* (pp. 36-46). Oxford, England: Heinemann Educational Publishers.

Lincoln, Y. S., and Guba, E. G. (1995). *Naturalistic inquiry*. Beverly Hills, CA: Sage Publications, Inc.

Wolf, R. L. (1980). A naturalistic view of evaluation. *Museum News*, p. 39.

Needs Assessment

Batsche, C., Hernandez, M., and Montenegro, M.C. (1999). Community needs assessment with Hispanic, Spanish-monolingual residents. *Evaluation and Program Planning, 22*, 13-20.

Henriksen, E. K. (1998). Environmental issues in the museum: Applying public perceptions in exhibition development. *Curator, 41*(2), 90-105.

Parsons, C. (1993). Front-end evaluation: How do you choose the right questions? In D. Thompson and others (Eds.), *Visitor studies: Theory, research, and practice. Vol. 6. Collected papers from the 1993 Visitor Studies Conference* (pp. 66-71). Jacksonville, AL: Visitor Studies Association.

Rossett, A. (1987). *Training needs assessment*. Englewood Cliffs, NJ: Educational Technology Publications.

Rubenstein, R. (1990). Focus groups and front-end evaluation. In S. Bitgood, A. Benefield and D. Patterson (Eds.), *Visitor studies: Theory, research, and practice. Vol. 3. Proceedings of the 1990 Visitor Studies Conference* (pp. 87-93). Jacksonville, AL: Center for Social Design.

Screven, C. G. (1990). Uses of evaluation before, during, and after exhibit design. *ILVS: A Journal of Visitor Behavior, 1*(2), 36-66.

Shettel, H. (1992). Front-end evaluation: Another useful tool. *ILVS Review: A Journal of Visitor Behavior, 2*(2), 275-280.

Wells, M., and Butler, B. (2002). A visitor-centered evaluation hierarchy. *Visitor Studies Today!, V*(1), 5-11.

Observations/Tracking and Timing

Braaksma, J. P. (1992). Time stamping: A method for keeping track of your visitors. In A. Benefield, S. Bitgood, and H. Shettel (Eds.), *Visitor studies: Theory, research, and practice Vol. 4. Collected papers from the 1991 Visitor Studies Conference*. Jacksonville, AL: The Center for Social Design.

McManus, P. (1989). Oh, yes, they do: How museum visitors read and interact with exhibit texts. *Curator, 32*(3), 174-189.

Serrell, B. (1998). *Paying attention: Visitors and museum exhibitions*. Washington, D. C.: American Association of Museums.

Orientation

Barnes, B. R., and Clawson, E. U. (1975). Do advance organizers facilitate learning? Recommendations for further research based on an analysis of 32 studies. *Review of Educational Research, 45*(4), 637-659.

Bitgood, S. (1988). Problems in visitor orientation and circulation. In S. Bitgood, J. Roper, and A. Benefield (Eds.), *Visitor studies 1988: Theory, research, and practice. Proceedings of the First Annual Visitor Studies Conference* (pp. 155-170). Jacksonville, AL: Center for Social Design.

Cohen, M. S., and others (1977). Orientation in a museum: An experimental study. *Curator, 20*(2), 85-97.

Corkill, A. J., Bruning, R. H., and Glover, J. A. (1988). Advance organizers: Concrete versus abstract. *Journal of Educational Research, 82*(2), 76-81.

Gilbert, J., and Priest, M. (1997). Models and discourse: A primary school science class visit to a museum. *Science Education (Special Issue: Informal Science Education), 81*(6), 749-762.

Kubota, C. A., and Olstad, R. G. (1991). Effects of novelty-reducing preparation on exploratory behavior and cognitive learning in a science museum setting. *Journal of Research in Science Teaching, 28*(3), 225-234.

Marino, M. (1995). Using evaluation to improve the design of a hand-held map. In S. Jens and S. Bitgood (Eds.), *Visitor studies: Theory, research, and practice. Vol. 8 #1. Selected papers from the 1995 Visitor Studies Conference* (pp. 125-132). Jacksonville, AL: Visitor Studies Association.

Parsons, C., and Breise, A. (2000). Orientation for self-guided school groups on field trips. *Visitor Studies Today!, III*(2), 7-10.

Talbot, J. F., Kaplan, R., Kuo, F., and Kaplan, S. (1993). Factors that enhance effectiveness of visitor maps. *Environment and Behavior, 25*(6), 743-760.

Wolf, R. L. (1986). The missing link: A look at the role of orientation in enriching the museum experience. *The Journal of Museum Education, Roundtable Reports, 11*(1), 17-21.

Outreach

deKoven, A., and Trumbull, D.J. (2004). Science graduate students doing science outreach: Participation effects and perceived barriers to participation. *Electronic Journal of Science Education, 7*(1).

Fortner, R. W., and Lahm, A. C. (1990). Research program outreach into the classroom: An estuarine research reserve initiative. *The Journal of Environmental Education, 21*(4), 7-12.

Jacobson, S.K., Gape, L., Sweeting, M., and Stein, T.V. (2005). Using a nominal group process to plan educational outreach for a Bahamas park. *Applied Environmental Education and Communication, 4*, 305-316.

Jacobson, S.K., McDuff, M.D., and Monroe, M.C. (2006). *Conservation Education and Outreach Techniques*. New York, NY: Oxford University Press.

Miller, B.K., Wilkins, B.T., and Spranger, M. (2000). Planning the Extension Program: How do we decide what to do? In *Fundamentals of a Sea Grant Extension Program* (pp. 14-23). Washington, D.C.: National Sea Grant Office.

Place-Based Education

Barnett, M., Lord, C., Strauss, E., and others (2006). Using the urban environment to engage youths in urban ecology field studies. *The Journal of Environmental Education, 37*(2), 3-11.

Downs, R.M., and Stea, D. (Eds.). (1973). *Image and environment: Cognitive mapping and spatial behavior*. (2005 paperback ed.). New Brunswick, NJ: AldineTransaction.

Fisman, L. (2005). The effects of local learning on environmental awareness in children: An empirical investigation. *The Journal of Environmental Education, 36*(3), 39-50.

Powers, A.L. (2004). An evaluation of four place-based education programs. *The Journal of Environmental Education, 35*(4), 17-32.

Sobel, D. (1998). *Mapmaking with children: Sense of place education for the elementary years*. Portsmouth, NH: Heinemann.

Sobel, D. (2004). *Place-based education: Connecting classrooms and communities*. Great
    Barrington, MA: The Orion Society.
Vaske, J.J., and Kobrin, K.C. (2001). Place attachment and environmentally responsible behavior.
    The Journal of Environmental Education, 32(4), 16-21.
Woodhouse, J.L., and Knapp, C.E. (2000). *Place-based curriculum and instruction: Outdoor and
    environmental education approaches.* ERIC Digests Report (ED448012) available from
    www.eric.ed.gov.

Presentations

Evans, C. W. (1984). Coaching: A system of evaluating interpretive presentations. *The Interpreter*
    (Fall), 18-22.
Knapp, D. (1996). *Evaluating the impact of environmental interpretation: A review of three
    research studies*. Research Symposium Proceedings. Coalition for Education in the Outdoors.

Programs/Education Programs

Bennett, D. B. (1988/89). Four steps to evaluating environmental education learning
    experiences. *The Journal of Environmental Education, 20*(2), 14-21.
Bishop, G. (1992). The effectiveness of the National Park Service Red Wolf Education Program at
    Gulf Islands National Seashore. *Legacy, 3*(5), 29-33.
Bransford, J. D., Brown, A. L., and Cocking, R. R. (1999). *How people learn: Brain, mind,
    experience, and school*. Washington, DC: National Academy Press.
Chenery, M. F., and Hammerman, W. (1984/85). Current practice in the evaluation of resident
    outdoor education programs: Report of a national survey. *The Journal of Environmental
    Education, 16*(2), 35-42.
Crane, V., and others (1994). *Informal science learning: What the research says about television,
    science museums, and community-based projects*. Dedham, MA: Research Communications
    Ltd.
DiEnno, C.M., and Hilton, S.C. (2005). High school students' knowledge, attitudes, and levels of
    enjoyment of an environmental education unit on nonnative plants. *The Journal of
    Environmental Education, 37*(1), 13-25.
Florida Department of Environmental Protection (1997). *Evaluability assessment: Education
    program, Rookery Bay NERR*. Report. Bureau of Coastal and Aquatic Managed Areas,
    Division of Marine Resources.
Garner, L.C., and Gallo, M.A. (2005). Field trips and their effect on student achievement and
    attitudes. *Journal of College Science Teaching, 34*(5), 14-17.
Gennaro, E., and Heller, P. (1983). Parent and child learning: A model for programs at informal
    science centers. *Journal of Museum of Education, 8*(2, Winter).
Hammerman, E., and Musial, D. (1995). *Classroom 2061: Activity-based assessments in science*.
    Arlington Heights, IL: IRI/SkyLight Training and Publishing, Inc.
Heimlich, J.E. (Ed.). (2005). *Environmental Education Special Issue—Free-Choice Learning and the
    Environment*, 11(3), July.
Hein, G. E. (1987). "The right test for hands-on learning?" *Science and Children*, October, pp. 8-
    12.
Hungerford, H. R., Litherland, R. A., Peyton, R. B., Ramsey, J. M., and Volk, T. L. (1996).
    Investigating and evaluating environmental issues and actions: Skill development program.
    Champaign, IL: Stipes Publishing LLC.

Liu, S.-T., and Kaplan, M.S. (2006). An intergenerational approach for enriching children's environmental attitudes and knowledge. *Applied Environmental Education and Communication, 5*, 9-20.

Looy, H., and Wood, J.R. (2006). Attitudes toward invertebrates: Are educational "Bug Banquets" effective? *The Journal of Environmental Education, 37*(2), 37-48.

Miller, B.K., Wilkins, B.T., and Spranger, M. (2000). Planning the extension program: How do we decide what to do? In *Fundamentals of a Sea Grant extension program* (pp. 14-23). Washington, D.C.: National Sea Grant Office.

Powers, A.L. (2004). An evaluation of four place-based education programs. *The Journal of Environmental Education, 35*(4), 17-32.

Ryan, C. (1991). The effect of a conservation program on schoolchildren's attitudes toward the environment. *Journal of Environmental Education, 22*(4), 30-35.

Shadish, W. R., Cook, T. D., and Leviton, L. C. (1991). *Foundations of program evaluation: Theory and practice*. Thousand Oaks, CA: Sage Publications.

Smith-Sebasto, N.J., and Walker, L.M. (2005). Toward a grounded theory for residential environmental education: A case study of the New Jersey School of Conservation. *The Journal of Environmental Education, 37*(1), 27-42.

Wholey, J., Hatry, H. P., and Newcomer, K. E. (1994). *Handbook of Practical Program Evaluation*. San Francisco, CA: Jossey-Bass Publishers.

Wilhelm, S.A., and Schneider, I.E. (2005). Diverse urban youth's nature: Implications for environmental education. *Applied Environmental Education and Communication, 4*, 103-113.

Scales/Measurement Instruments

BEEC. (2004, July 2004). *75 eval tools from Bay Area Environmental Education Evaluation Learning Community (BEEC)*. Retrieved November 2005 from http://www.peecworks.org/PEEC/PEEC_Inst/S006D6299.

Bluhm, W.J., Hungerford, H.R., McBeth, W., and Volk, T.L. (1995). The middle school report: A final report on the development and pilot assessment of The Middle School Environmental Literacy Assessment instrument. In R. Wilke (Ed.), *Environmental education literacy/needs assessment project: Assessing environmental literacy of students and environmental education needs of teachers. Final Report for 1993-1995* (pp. 8-29). Stevens Point, WI: University of Wisconsin-Stevens Point.

Bradley, J.C., Waliczek, T.M., and Zajicek, J.M. (1999). Relationship between environmental knowledge and environmental attitude of high school students. *Journal of Environmental Education, 30*(3), 17-21.

Bringle, R.G., Phillips, M., and Hudson, M. (2004). *The measure of service learning: Research scales to assess student experiences*. Washington, DC: American Psychological Association.

Butler, J.S., Shanahan, J.E., and Decker, D.J. (2001). *Wildlife attitudes and values: A trend analysis*. Report. Ithaca, NY: Cornell.

Clayton, S. (2003). Environmental identity: A conceptual and an operational definition. In S. Clayton and S. Opotow (Eds.), *Identity and the natural environment: The psychological significance of nature* (pp. 45-65). Cambridge, MA: The MIT Press.

Cordano, M., Welcomer, S.A., and Scherer, R.F. (2003). An analysis of the predictive validity of the New Ecological Paradigm Scale. *The Journal of Environmental Education, 34*(3), 22-28.

Corley, E. L. (1997). *A constructivist interpretation of attitude toward science*. Paper. Presented at Mid-Western Educational Research Association, Chicago, IL.

Culen, G.R., and Mony, P.R.S. (2003). Assessing environmental literacy in a nonformal youth
program. *The Journal of Environmental Education, 34*(4), 26-28.

Dietz, T., Fitzgerald, A., and Shwom, R. (2005). Environmental values. In P. A. Matson (Ed.),
Annual review of environment and resources (Vol. 30, pp. 335-372). Palo Alto, CA: Annual
Reviews.

Dunlap, R.E., and Van Liere, K.D. (1978). The "new environmental paradigm": A proposed
measuring instrument and preliminary results. *Journal of Environmental Education, 9*, 10-19.

Dunlap, R.E., Liere, K.D.V., Mertig, A.G., and Jones, R.E. (2000). Measuring endorsement of the
New Ecological Paradigm: A revised NEP scale. *Journal of Social Issues, 56*(3), 425-442.

Fortner, R.W. (1978). *Survey of oceanic attitudes and knowledge.* Available from ERIC
(ED159023) at www.eric.ed.gov.

Gotch, C., and Hall, T. (2004). Understanding nature-related behaviors among children through a
Theory of Reasoned Action approach. *Environmental Education Research, 10*(2), 157-177.

Huntoon, J.E., Bluth, G.J.S., and Kennedy, W.A. (2001). Measuring the effects of a research-
based field experience on undergraduates and K-12 teachers. *Journal of Geoscience
Education, 49*(3), 235-248.

Johnson, C.Y., Bowker, J.M., and Cordell, H.K. (2004). Ethnic variation in environmental belief
and behavior: An examination of the New Ecological Paradigm in a social psychological
context. *Environment and Behavior, 36*(2), 157-186.

Jurin, R.R., and Fortner, R.W. (2002). Symbolic beliefs as barriers to responsible environment
behavior. *Environmental Education Research, 8*(4), 373-394.

Kals, E., and Ittner, H. (2003). Children's environmental identity: Indicators and behavioral
impacts. In S. Clayton and S. Opotow (Eds.), *Identity and the natural environment: The
psychological significance of nature* (pp. 135-157). Cambridge, MA: The MIT Press.

Kellert, S. (1985). Attitudes toward animals: Age-related development among children. *Journal
of Environmental Education, 16*(3), 29-35.

Kellert, S.R., and Berry, J.K. (1980). *Knowledge, affection and basic attitudes toward animals in
American society*. Report No. 024-010-00-625-1. Washington, DC: U.S. Government, Fish
and Wildlife Service.

Kellert, S.R. (1976). *Perceptions of animals in American society.* Paper presented at the 41st
North American Wildlife Conference.

Lalonde, R., and Jackson, E. (2002). The New Environmental Paradigm scale: Has it outlived its
usefulness? *The Journal of Environmental Education, 33*(4), 28-36.

Lasso de la Vega, E. (2004). *Awareness, knowledge, and attitude about environmental education:
Responses from environmental specialists, high school instructors, students, and parents.*
Dissertation, College of Education, University of Central Florida, Orlando, FL.

Leeming, F. C., Dwyer, W. O., and Bracken, B. A. (1995). Children's environmental attitude and
knowledge scale: Construction and validation. *The Journal of Environmental Education 26*(3),
22-31.

Maloney, M.P., Ward, M.P., and Braucht, G.N. (1975). A revised scale for the measurement of
ecological attitudes and knowledge. *American Psychologist, 30*, 787-790.

Manoli, C.C., Johnson, B., and Dunlap, R. (2005, April 11). *Assessing children's views of the
environment: Modifying the New Ecological Paradigm Scale for use with children.* Paper
presented at the Annual meeting of the American Educational Research Association (AERA),
Montreal, Quebec.

Mayer, F.S., and Frantz, C.M. (2004). The connectedness to nature scale: A measure of
individuals' feeling in community with nature. *Journal of Environmental Psychology, 24*, 503-

515.

Moore, A. D., and Martin, J. T. (1990). *How do teachers feel about science?: Measurement of attitudes towards science*. Paper presented at the annual meeting of the Northern Rocky Mountain Educational Research Association, Greeley, CO.

Morrone, M., Mancl, K., and Carr, K. (2001). Development of a metric to test group differences in ecological knowledge as one component of environmental literacy. *The Journal of Environmental Education, 32*(4), 33-42.

Musser, L. M., and Diamond, K. E. (1999). The children's attitudes toward the environment scale for preschool children. *The Journal of Environmental Education 30*(2), 23-30.

Musser, L. M., and Malkus, A. J. (1994). The children's attitudes toward the environment scale. *Journal of Environmental Education, 25*(3), 22-26.

Payne, D.A. (2000). *Evaluating service-learning activities and programs*. Lanham, MD: The Scarecrow Press, Inc.

Payne, P.G. (2006). Environmental education and curriculum theory. *The Journal of Environmental Education, 37*(2), 25-35.

Piburn, M., and Sidlik, L. P. (1992). *An investigation of projective measures of attitude toward science*. Paper presented at the annual meeting of the National Association for Research in Science Teaching, Boston, MA.

Poresky, R.H. (1990). The young children's empathy measure: Reliability, validity and effects of companion animal bonding. *Psychological Reports, 66*, 931-936.

Purdy, K.G., and Decker, D.J. (1989). *Obtaining wildlife values information for management: The Wildlife Attitudes and Values Scale (WAVS)*. Human Dimensions Research Unit Publication 89-2. Ithaca, NY: Dept. of Natural Resources, NYS College of Agriculture and Life Sciences, Cornell University.

Rideout, B.E. (2005). The effect of a brief environmental problems module on endorsement of the New Ecological Paradigm in college students. *The Journal of Environmental Education, 37*(1), 3-11.

Rideout, B.E., Hushen, K., McGinty, D., and others (2005). Endorsement of the New Ecological Paradigm in systematic and e-mail samples of college students. *The Journal of Environmental Education, 36*(2), 15-23.

Rotter, J. *Locus of Control Scale*. Retrieved May 31 2005, from www.ballarat.edu.au/ard/bssh/psych/rot.htm.

Schultz, P.W. (2000). Empathizing with nature: The effects of perspective taking on concern for environmental issues. *Journal of Social Issues, 56*(3), 391-406.

Schultz, P.W. (2001). The structure of environmental concern: Concern for self, other people, and the biosphere. *Journal of Environmental Psychology, 21*, 327-339.

Schultz, P.W., Shriver, C., Tabanico, J.J., and Khazian, A.M. (2004). Implicit connections with nature. *Journal of Environmental Psychology, 24*, 31-42.

Schultz, P.W., Unipan, J.B., and Gambra, R.J. (2000). Acculturation and ecological worldview among Latino Americans. *The Journal of Environmental Education, 31*(2), 22-27.

Shean, G.D., and Shei, T. (1995). The values of student environmentalists. *The Journal of Psychology, 129*(5), 559-564.

Sivek, D.J. (2002). Environmental sensitivity among Wisconsin high school students. *Environmental Education Research, 8*(2), 155-170.

Smith-Sebasto, N.J. (1992). The Revised Perceived Environmental Control Measure (RPECM): A review and analysis. *Journal of Environmental Education, 23*(2), 24-33.

Steel, B.S., Smith, C., Opsommer, L., and others (2005). Public ocean literacy in the United

States. *Ocean and Coastal Management, 48*, 97-114.

Thompson, S.C.G., and Barton, M.A. (1994). Ecocentric and anthropocentric attitudes toward the environment. *Journal of Environmental Psychology, 14*, 149-157.

Vaske, J.J., and Kobrin, K.C. (2001). Place attachment and environmentally responsible behavior. *The Journal of Environmental Education, 32*(4), 16-21.

Villacorta, M., Koestner, R., and Lekes, N. (2003). Further validation of the Motivation Toward the Environment Scale. *Environment and Behavior, 35*(4), 486-505.

Weigel and Weigel. (1978). Environmental concern: The development of a measure. *Environment and Behavior, 10*, 3-15.

Zimmermann, L. K. (1996). The development of an environmental values short form. *The Journal of Environmental Education, 28*(1), 32-37.

School Groups

Bitgood, S. (1993). What do we know about school field trips? In P. McNamara, M. Borun, S. Grinell, and B. Serrell (Eds.), *What research says about learning in science museums* (pp. 12-16). Washington, D.C.: Association of Science-Technology Centers (ASTC).

Bixler, R. D., Carlisle, C. L., Hammitt, W. E., and Floyd, M. F. (1994). Observed fears and discomforts among urban students on field trips to wildlands areas. *The Journal of Environmental Education, 26*(1), 24-33.

Falk, J., and Balling, J. (1993). The field trip milieu: Learning and behavior as a function of contextual events. *Visitor Behavior, 8*(1).

Falk, J., and Dierking, L. (1997). School field trips: Assessing their long-term impact. *Curator, 40*(3), 211 – 218.

Falk, J. H., and Balling, J. D. (1980). "The school field trip: Where you go makes the difference." *Science and Children*, pp. 6-9.

Falk, J. H., Martin, W. W., and Balling, J. D. (1978). The novel field-trip phenomenon: Adjustment to novel settings interferes with task learning. *Journal of Research in Science Teaching, 15*(2), 127-134.

Fortner, R., and Mayer, V. (1991). Repeated measures of students' marine and Great Lakes awareness. *Journal of Environmental Education, 23*(1, Fall), 30-35.

Fortner, R. W., and Lahm, A. C. (1990). Research program outreach into the classroom: An estuarine research reserve initiative. *The Journal of Environmental Education, 21*(4), 7-12.

Gabel, D. L. (1994). *Handbook of research on science teaching and learning*. New York, NY: Simon and Schuster Macmillan.

Gennaro, E. D. (1981). The effectiveness of using previsit instructional materials on learning for a museum field trip experience. *Journal of Research in Science Teaching, 18*(3), 275-279.

Gilbert, J., and Priest, M. (1997). Models and discourse: A primary school science class visit to a museum. *Science Education (Special Issue: Informal Science Education), 81*(6), 749-762.

Gottfried, J. (1980). Do children learn on school field trips? *Curator, 23*(3), 165-174.

Griffin, J., and Symington, D. (1997). Moving from task-oriented to learning-oriented strategies on school excursions to museums. *Science Education (Special Issue: Informal Science Education), 81*(6), 763-779.

Hein, G. E., and Price, S. (1994). *Active assessment for active science: A guide for elementary school teachers*. Portsmouth, NH: Heinemann.

Kubota, C. A., and Olstad, R. G. (1991). Effects of novelty-reducing preparation on exploratory behavior and cognitive learning in a science museum setting. *Journal of Research in Science Teaching, 28*(3), 225-234.

Lewis, G. E. (1981). A review of classroom methodologies for environmental education. *Journal of Environmental Education, 13*(2), 12-15.

Martin, W. W., Falk, J., and Balling, J. (1981). Environmental effects on learning: The outdoor field trip. *Science Education, 65*(3), 301-309.

Meng, E., and Doran, R. L. (1990). What research says about appropriate methods of assessment. *Science and Children*, September, pp. 42-45.

Novak, J. D. (1998). *Learning, creating, and using knowledge: Concept maps as facilitative tools in schools and corporations*. Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

Parsons, C. (1999). Do self-guided groups learn anything? In *AZA Annual Conference Proceedings*. Wheeling, WV: Association of Zoos and Aquariums.

Parsons, C., and Breise, A. (2000). Orientation for self-guided school groups on field trips. *Visitor Studies Today!, III*(2), 7-10.

Parsons, C., and Muhs, K. (1996). Field trips and parent chaperones. In S. Bitgood (Ed.), *Visitor studies: Theory, research, and practice. Vol.7 #1. Selected papers from the 1994 Visitor Studies Conference* (pp. 57-61). Jacksonville, AL: Visitor Studies Association.

Price, S., and Hein, G. E. (1991). More than a field trip: Science programmes for elementary school groups at museums. *International Journal of Science Education, 13*(5), 505-519.

Ramsey, J., Hungerford, H. R., and Tomera, A. N. (1981). The effects of environmental action and environmental case study instruction on the overt environmental behavior of eighth-grade students. *Journal of Environmental Education, 13*, 24-29.

Ryan, C. (1991). The effect of a conservation program on schoolchildren's attitudes toward the environment. *Journal of Environmental Education, 22*(4), 30-35.

Stronck, D. R. (1983). The comparative effects of different museum tours on children's attitudes and learning. *Journal of Research in Science Teaching, 20*(4), 283-290.

Tisdal, C. (1996). Using group interviews to target a school visit program: A case study. In S. Bitgood (Ed.), *Visitor studies: Theory, research, and practice. Vol. 7 #1. Selected papers from the 1994 Visitor Studies Conference* (pp. 99-109). Jacksonville, AL: Visitor Studies Association.

Service Learning

Beane, D.B., and Pope, M.S. (2002). Leveling the playing field through object-based service learning. In S. G. Paris (Ed.), *Perspectives on object-centered learning in museums* (pp. 325-349). Mahwah, NJ: Lawrence Erlbaum Associates, Publishers.

Billig, S.H. (2000). *The impacts of service-learning on youth, schools and communities: Research on K-12 school-based service-learning, 1990-1999*. Retrieved December 2004 from http://www.wkkf.org.

Bringle, R.G., Phillips, M., and Hudson, M. (2004). *The Measure of Service Learning: Research scales to assess student experiences*. Washington, DC: American Psychological Association.

Brown, J.S., Collins, A., and Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher, 18*(1), 32-42.

Payne, D.A. (2000). *Evaluating service-learning activities and programs*. Lanham, MD: The Scarecrow Press, Inc.

Scales, P.C., Blyth, D.A., Berkas, T.H., and Kielsmeier, J.C. (2000). The effects of service-learning

on middle school students' social responsibility and academic success. *Journal of Early Adolescence, 20*(3), 332-358.

Schine, J. (1997). School-based service: Reconnecting schools, communities, and youth at the margin. *Theory Into Practice, 36*(1), 170-175.

Schine, J. (Ed.). (1997). *Service learning*. Chicago, IL: University of Chicago Press.

Social Marketing

Andreasen, A.R. (1995). *Marketing social change: Changing behavior to promote health, social development, and the environment* (1st ed.). San Francisco: Jossey-Bass Publishers.

Kotler, P., and Roberto, E. L. (1989). *Social marketing: Strategies for changing public behavior*. New York, NY: The Free Press, A Division of Macmillan, Inc.

McKenzie-Mohr, D., and Smith, W. (1999). *Fostering sustainable behavior: An introduction to community-based social marketing*. Gabriola Island, B.C., Canada: New Society Publishers.

Monroe, M.C. (2003). Two avenues for encouraging conservation behaviors. *Human Ecology Review, 10*(2), 113-125.

Schwartz, B. (1996). *Strengthening Education as a Management Tool: Thinking like a social marketer*: NOAA NMS.

Statistics

Gonick, L., and Smith, W. (1993). *The Cartoon Guide to Statistics*. New York, NY: Harper Perennial, a division of HarperCollins Publishers.

Jaeger, R. M. (1990). *Statistics: A spectator sport*. Newbury Park, CA: Sage Publications.

Kanji, G. K. (1993). *100 Statistical Tests*. London: Sage Publications.

Lewis-Beck, M. S. (1995). *Data Analysis: An introduction*. Newbury Park, CA: Sage Publications.

Miller, D. C. (1991). *Handbook of Research Design and Social Measurement*. Newbury Park, CA: Sage Publications.

Summative Evaluation

Garibay, C., and Perry, D. (1999). Summative evaluation for the Interpretive Stations Program at the Field Museum. In *Current Trends in Audience Research, Vol. 12*. Washington, D.C.: AAM's Committee on Audience Research and Evaluation (CARE).

Screven, C. G. (1990). Uses of evaluation before, during, and after exhibit design. *ILVS: A Journal of Visitor Behavior, 1*(2), 36-66.

Wells, M., and Butler, B. (2002). A visitor-centered evaluation hierarchy. *Visitor Studies Today!, V*(1), 5-11.

Surveys

Fink, A., and Kosecoff, J. (1985). *How to conduct surveys: A step by step guide*. Newbury Park, CA: Sage Publications.

Firebaugh, G. (1997). *Analyzing repeated surveys*. Newbury Park, CA: Sage Publications.

Kalton, G. (1983). *Introduction to survey sampling*. Newbury Park, CA: Sage Publications.

Korn, R., and Sowd, L. (1990). *Visitor surveys: A user's manual*. Washington, D.C.: American Association of Museums.

Teacher Education/Professional Development

Chase, V. C., and Boone, W. J. (1999). An effective teacher institute for curriculum
dissemination. *Curator, 42*(3), 198-215.

Corley, E. L. (1997). *A constructivist interpretation of attitude toward science*. Paper. Presented
at Mid-Western Educational Research Association, Chicago, IL.

Cronin-Jones, L. L. (1991). Science teacher beliefs and their influence on curriculum
implementation: Two case studies. *Research in Science Teaching, 28*(3), 235-250.

Davis, G.R. (2000). Standards-based education and its impact on environmental science
education. *Electronic Journal of Science and Education, 4*(3).

Downing, J. E., Filer, J. D., and Chamberlain, R. A. (1997). *Science process skills and attitudes of
preservice elementary teachers*. Paper presented at the Mid-South Educational Research
Association.

Fien, J., and Rawling, R. (1996). Reflective practice: A case study of professional development for
environmental education. *Journal of Environmental Education, 27*(3), 11-21.

Gabel, D. L. (1994). *Handbook of research on science teaching and learning*. New York, NY:
Simon and Schuster Macmillan.

Guskey, T.R. (2000). *Evaluating professional development*. Thousand Oaks, CA: Corwin Press, Inc.

Guskey, T.R. (2003). Analyzing lists of the characteristics of effective professional development
to promote visionary leadership. *NASSP (National Association of Secondary School
Principals) Bulletin, 87*(637), 38-54.

Kahle, J.B. (1997). Teacher professional development: Does it make a difference in student
learning? Washington, D.C.: Testimony for U.S. House of Representatives, Committee on
Science, Oct. 23, 1997.

Kenney, J.L., Militana, H.P., and Donohue, M.H. (2003). Helping teachers to use their school's
backyard as an outdoor classroom: A report on the Watershed Learning Center program.
The Journal of Environmental Education, 35(1), 18-26.

Lawrenz, F., and McCreath, H. (1988). Integrating quantitative and qualitative evaluation
methods to compare two teacher inservice training programs. *Research in Science Teaching
25*(5), 397-407.

Loucks-Horsley, S. (1996). The concerns-based adoption model (CBAM): A model for change in
individuals. In R. Bybee (Ed.), *Professional development for science education, a chapter in
National Standards and the Science Curriculum*. Dubuque, IA: Kendall/Hunt Publishing,
Company.

Loucks-Horsley, S., Love, N., Stiles, K.E., and others (2003). *Designing professional development
for teachers of science and mathematics* (2nd ed.). Thousand Oaks, CA: Corwin Press, Inc.

Loucks-Horsley, S., Stiles, K., and Hewson, P. (1996). Principles of effective professional
development for mathematics and science education: A synthesis of standards. *NISE
(National Institute for Science Education) Brief, 1*(1), 1-6.

Moore, A. D., and Martin, J. T. (1990). *How do teachers feel about science?: Measurement of
attitudes towards science*. Paper presented at the annual meeting of the Northern Rocky
Mountain Educational Research Association, Greeley, CO.

O'Brien, T. (1992). Science inservice workshops that work for elementary teachers. *School
Science and Mathematics, 92*(8), 422-426.

Ramey, L. (1999). *Using environmental science education curricula and experiences to enhance
science teaching for all students: Creating an integrated, inclusive learning environment.*
Paper presented at the meeting of The Association for the Education of Teachers in Science,
Austin, TX.

Shepardson, D.P., and Harbor, J. (2004). ENVISION: The effectiveness of a dual-level professional development model for changing teacher practice. *Environmental Education Research, 10*(4), 471-492.

Shepardson, D.P., Harbor, J., Cooper, B. and McDonald, J. (2002). The impact of a professional development program on teachers' understandings about watersheds, water quality, and stream monitoring. *The Journal of Environmental Education, 33*(3), 34-40.

Staten, M. E. (1998). *Action research study: A framework to help move teachers toward an inquiry-based science teaching approach*. Milwaukee Public Schools, WI.

Wood, B.B. (2001). Stake's Countenance Model: Evaluating an environmental education professional development course. *The Journal of Environmental Education, 32*(2), 18-27.

Tours

Moscardo, G. (1999). *Making visitors mindful: Principles for creating sustainable visitor experiences through effective communication*. Champaign, IL: Sagamore Publishing.

Sakofs, M. S. (1984). Optimizing the educational impact of a museum tour. *Curator, 27*(2), 135-140.

Stronck, D. R. (1983). The comparative effects of different museum tours on children's attitudes and learning. *Journal of Research in Science Teaching, 20*(4), 283-290.

Visitors

Borun, M., Grinell, S., McNamara, P., and Serrell, B. (1993). *What research says about learning in science museums*. Washington, D.C.: Association of Science-Technology Centers (ASTC).

Braaksma, J. P. (1992). Time stamping: A method for keeping track of your visitors. In A. Benefield, S. Bitgood, and H. Shettel (Eds.), *Visitor studies: Theory, research, and practice Vol. 4. Collected papers from the 1991 Visitor Studies Conference*. Jacksonville, AL: The Center for Social Design.

Crane, V., and others (1994). *Informal science learning: What the research says about television, science museums, and community-based projects*. Dedham, MA: Research Communications Ltd.

Dierking, L., and Holland, D. (1996). Getting inside visitors' heads: Utilizing interpretive carts as a mechanism for analyzing visitor conversations. In S. Bitgood (Ed.), *Visitor studies: Theory, research, and practice. Vol. 7. #1. Selected papers from the 1994 Visitor Studies Conference* (pp. 19-25). Jacksonville, AL: Visitor Studies Association.

Falk, J. H., Moussouri, T., and Coulson, D. (1998). The effect of visitors' agendas on museum learning. *Curator, 41*(2), 107-120.

Falk, J.H., Scott, C., Dierking, L., and others (2004). Interactives and visitor learning. *Curator, 47*(2), 171-198.

Fischer, D. K. (1997). Connecting with visitor panels. *Museum News*, May/June, pp. 33-37.

Hood, M. G. (1983). "Staying away: Why people choose not to visit museums." *Museum News*, pp. 50-57.

— (1993). Comparison of visitor responses at two outdoor settings. *Visitor Behavior, VIII*(1), 12.

— (1993). Comfort and caring: Two essential environmental factors. *Environment and Behavior, 25*(6), 710-724.

— (1994). *Audience research for outdoor settings*. Paper. Presented at the Visitor Studies Association Conference in Raleigh, NC.

— (1996). A view from "outside": Research on community audiences. In S. Bitgood (Ed.), *Visitor studies: Theory, research, and practice. Vol. 7 #1. Selected papers from the 1994 Visitor Studies Conference* (pp. 77-87). Jacksonville, AL: Visitor Studies Association.

Hong, A., and Anderson, D.H. (2006). Barriers to participation for Latino people at Dodge Nature Center. *The Journal of Environmental Education, 37*(4), 33-44.

Korn, R. (1995). An analysis of differences between visitors at natural history museums and science centers. *Curator, 38*(3), 150-160.

Moscardo, G. (1999). *Making visitors mindful: Principles for creating sustainable visitor experiences through effective communication*. Champaign, IL: Sagamore Publishing.

Moscardo, G., and Pearce, P. L. (1986). Visitor centres and environmental interpretation: An exploration of the relationships among visitor enjoyment, understanding and mindfulness. *Journal of Environmental Psychology, 1986*(6), 89-108.

Serrell, B. (1990). *What research says about learning in science museums*. Washington, D.C.: Association of Science-Technology Centers (ASTC).

— (1998). *Paying attention: Visitors and museum exhibitions*. Washington, D. C.: American Association of Museums.

Wells, M., and Butler, B. (2002). A visitor-centered evaluation hierarchy. *Visitor Studies Today!, V*(1), 5-11.

Volunteers/Docents

Cunningham, M.K. (2004). *The Interpreters Training Manual for Museums*. Washington, D.C.: American Association of Museums.

Evans, C.W. (1984). Coaching: A system of evaluating interpretive presentations. *The Interpreter*(Fall), 18-22.

Liu, S.-T., and Kaplan, M.S. (2006). An intergenerational approach for enriching children's environmental attitudes and knowledge. *Applied Environmental Education and Communication, 5*, 9-20.

Martinez, T.A., and McMullin, S.L. (2004). Factors affecting decisions to volunteer in nongovernmental organizations. *Environment and Behavior, 36*(1), 112-126.

Meehan, D.B., and Berta, S. (1993). Developing a volunteer program for public environmental education (pp. 32). Pullman, WA: Washington State University, Cooperative Extension Service.

Parsons, C. (1996). Starting an interpreter evaluation program. *Legacy*, March/April. pp. 8-12.

Web-Based Evaluation

Archer, T.M. (2003). Web-based surveys. *Journal of Extension, 41*(4), 6. Available online at http://www.joe.org/joe/2003august/tt6.shtml.

Best, S.J., and Krueger, B. (2004). *Internet Data Collection*. Thousand Oaks, CA: Sage Publications.

Birnholtz, J.P., Horn, D.B., Finholt, T.A., and Bae, S.J. (2004). The effects of cash, electronic, and paper gift certificates as respondent incentives for a web-based survey of technologically sophisticated respondents. *Social Science Computer Review, 22*(3), 355-362.

Bradley, R.V., and Sankar, C.S. (2003). *Outcomes assessment: Electronic surveys versus paper-based surveys.* Paper presented at the ASEE (American Society for Engineering Education) Southeast Section Conference, Macon, GA. Available at http://litee.auburn.edu/media/pdfs/eval_conf_papers/2003aseese_bradley.pdf.

Cobanoglu, C., Warde, B., and Moreo, P. (2001). A comparison of mail, fax and web-based

survey methods. *International Journal of Market Research, 43*(4), 441-452.

Cole, S.T. (2005). Comparing mail and web-based survey distribution methods: Results of surveys to leisure travel retailers. *Journal of Travel Research, 43*, 422-430.

Comley, P. (2002). *Online surveys and internet research*. Retrieved July 29, 2005, from http://www.virtualsurveys.com/news/papers/paper_1.asp.

Cook, C., Heath, F., and Thompson, R.L. (2000). A meta-analysis of response rates in web- or Internet-based surveys. *Educational and Psychological Measurement, 60*(6), 821-836.

Couper, M.P. (2000). Web surveys: A review of issues and approaches. *Public Opinion Quarterly, 64*(4), 464-494.

Couper, M.P., Traugott, M.W., and Lamias, M.J. (2001). Web survey design and administration. *Public Opinion Quarterly, 65*(2), 230-253.

Crawford, S.D., Couper, M.P., and Lamias, M.J. (2001). Web surveys: Perceptions of burden. *Social Science Computer Review, 19*(2), 146-162.

Dillman, D.A. (2000). *Mail and Internet Surveys: The tailored design method* (2nd ed.). New York, NY: John Wiley and Sons, Inc.

Dillman, D.A., Tortora, R.D., and Bowker, D. (1998). *Principles for Constructing Web Surveys*. SESRC Technical Report No. 98-50. Available online at http://survey.sesrc.wsu.edu/dillman/papers.htm. Pullman, WA: Washington State University.

Gunn, H. (2002). Web-based surveys: Changing the survey process. *First Monday, 7*(12). Available at http://firstmonday.org/issues/issue7_12/gunn/index.html.

McCauley, D.P., Gilbert, P.J., and Fralicx, R.D. (2002). How to make online surveys work for you: Observations and 10 best practices. *Journal of Employee Communication Management, July/August*. Available at http://www.mercerhr.com (as of 7/7/03).

Schonlau, M., Fricker, R.D., Jr., and Elliott, M.N. (2001). *Conducting research surveys via e-mail and the Web*, from http://www.rand.org/publications.

Witte, J.C., Pargas, R.P., Mobley, C., and Hawdon, J. (2004). Instrument effects of images in web surveys: A research note. *Social Science Computer Review, 22*(3), 363-369.

Website Evaluation

Campbell, H., and Wells, M. (1997). Assessment of museum World Wide Web home page formats. In M. Wells and R. Loomis (Eds.), *Visitor studies: Theory, research, and practice. Vol. 9. Selected papers from the 1996 Visitor Studies Conference* (pp. 216-226). Jacksonville, AL: Visitor Studies Association.

Chadwick, J. (1998). Characteristics and patterns of behavior in visitors to a museum website. *Visitor Studies Today!, I*(3), 5-7.

Kuniavsky, M. (2003). *Observing the user experience: A practitioner's guide to user research*. San Francisco, CA: Morgan Kaufmann Publishers.

Peacock, D. (2002). Statistics, structures and satisfied customers: Using web log data to improve site performance. In D. Bearman and J. Trant (Eds.), *Museums and the Web 2002: Selected papers from an international conference* (pp. 157-165). Pittsburgh, PA: Archive and Museum Informatics. (www.archimuse.com)

Sarraf, S. (1999). A Survey of museums on the Web: Who uses museum websites? *Curator, 42*(3), 231-243.

Schaller, D., Allison-Bunnell, S., Borun, M., and Chambers, M. B. (2002). How do you like to learn? Comparing user preferences and visit length of educational web sites. *Visitor Studies Today!, V*(II), 1-10.

Planning for Meaningful Evaluation Workshop

Host:_____   **Date:**_____

The NOAA Coastal Services Center is committed to delivering timely and effective training to the coastal management community. We would appreciate your feedback both positive and negative so that we might improve future courses. **Please complete the following questions and submit before leaving.**

1) Which of the following best describes your organization or company? (Check <u>one</u>.)
- ❑ Federal Government - NOAA (including contractors) - NOAA Line Office_____, Program Office_____
- ❑ Federal Government - Non-NOAA (including contractors) - Federal Agency Name _____
- ❑ University/Academic, excluding Sea Grant   ❑ Sea Grant
- ❑ State Coastal Zone Management Agency   ❑ National Estuarine Research Reserve
- ❑ Other State Government   ❑ National Estuary Program
- ❑ Local Government   ❑ NGO/Non-Profit
- ❑ Military   ❑ Private
- ❑ Other (please specify) _____   ❑ International

2) Which of the following best describes your primary role? (Check <u>one</u>.)
- ❑ Data Management   ❑ Volunteer
- ❑ GIS   ❑ Program Management
- ❑ Communication/Outreach   ❑ Commercial Use
- ❑ Extension/Education   ❑ Recreational Use
- ❑ Student (Area of study?) _____   ❑ Community Planning
- ❑ Other (please specify)_____   ❑ Research/Science/Engineering

3) How did you hear about this course? (Check <u>one</u>.)
- ❑ NOAA Coastal Services Center Web site   ❑ Supervisor
- ❑ NOAA Coastal Services Center publication   ❑ Conference
- ❑ Other (please specify) _____   ❑ Local Host

4) How well were the following objectives met? (Check one box for each objective.)

Can you...	I am not able to do this.	I was able to do this prior to the course. The course DID NOT improve this ability.	I was able to do this prior to the course. The course DID improve this ability.	I am able to do this because of this course.	Not Applicable (Cannot rate)
Determine the evaluation question	❑	❑	❑	❑	❑
Create a context description	❑	❑	❑	❑	❑
Identify logic model components appropriate to the evaluation question	❑	❑	❑	❑	❑
Assess plausibility using strategies from social science models	❑	❑	❑	❑	❑
Identify influences that can help or hinder the evaluation	❑	❑	❑	❑	❑
Create effective performance measures that support the evaluation question	❑	❑	❑	❑	❑
Select appropriate data collection methods	❑	❑	❑	❑	❑
Analyze the strengths and weaknesses of an evaluation plan	❑	❑	❑	❑	❑

5) Workshop Pace

	Too slow 1	2	Just right 3	4	Too fast 5
The pace of the class was	Too slow 1	2	Just right 3	4	Too fast 5
The time allotted for discussion was	Too short 1	2	Just right 3	4	Too long 5

6) Workshop Format   **(circle the most appropriate response)**

Presentation materials (slide shows, flip charts, overheads, etc.)	Detracted from understanding 1	2	3	Enhanced understanding 4
Course manual	Detracted from understanding 1	2	3	Enhanced understanding 4
The presenters were	Poorly prepared 1	2	3	Well prepared 4
The presenters communicated concepts and ideas	Poorly 1	2	3	Very well 4
There was a good balance between lectures and activities	Strongly disagree 1	2	3	Strongly agree 4
I would recommend this course to another coastal professional	Strongly disagree 1	2	3	Strongly agree 4

7) Value and Applicability   **(circle the most appropriate response)**

I gained knowledge and skills that I will apply in my job.	Strongly disagree 1	2	3	Strongly agree 4	NA
I will use the knowledge and skills gained to more systematically design, monitor, **evaluate**, and adjust resource management efforts at my workplace.	Strongly disagree 1	2	3	Strongly agree 4	NA
Attending this course was good use of my time.	Strongly disagree 1	2	3	Strongly agree 4	NA
Prior to this course what was your level of understanding of the material covered?	0% 20% 40% 60% 80% 100%				
After this course what is your level of understanding of the material covered?	0% 20% 40% 60% 80% 100%				

8) Content and Learning

A. List the topics/steps (covered in this course) to consider when planning for evaluation.

B. Over the past 2 days, what is one concept did you learn that you consider most useful?

    I learned that:
    This is useful to me because:

9) On what topics/skills would you have liked more time or information?

10) Other comments, suggestions, ideas?

NOAA Coastal Services Center